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DISEASES CAUSED BY BACTERIA AND FUNGI.

- I. SEELEMAN, M. (1931). Neueste Forschungsergebnisse auf dem Gebiete der Mastitisforschung (insbesondere Galtbekämpfung). [**Latest Results in Mastitis Investigations (particularly Chronic Bovine Mastitis)**].—*Berl. tierärztl. Wschr.* **47**. 812-814.
- II. SEELEMAN, M. (1932). Mein Kampf gegen die Streptokokkenmastitis. [**My Campaign against Streptococcal Mastitis**].—*Tierärztl. Rdsch.* **38**. 19-22 and 38-39.
- III. HAUPT, H. (1931). Zur Biologie des *Streptococcus equi* und des *Streptococcus agalactiae*. [**On the Biology of *S. equi* and *S. agalactiae***].—*Zlb. Bakt. I. (Orig.)* **123**. 240-241.

I & II. Among the herds in Schleswig-Holstein, Seelemann finds that, in the majority containing 50 to 100 or more cows, at least a half of the functioning quarters show abnormalities. Many of these can be detected clinically and a greater number by microscopic or biochemical tests. On the other hand a considerable proportion of cases are only shown up by cultural methods. Of the biochemical tests, he prefers the test for catalase content to those for chloride and reaction.

In contrast to his earlier findings, which were that mastitis streptococci produced a flocculent deposit when grown in broth, he now reports that many strains produce a turbidity. These he calls atypical, and in certain herds the greater part of the strains may be of this kind. Mastitis may also be caused by streptococci showing yet other characters, some of which are similar to strains of direct human origin.

In both these reports he also modifies his earlier view that the injection of chemical substances into the udder was of no value, and states that if used during the dry period, that is when the streptococci tend to decrease or disappear spontaneously, injections of rivanol or similarly acting substances may be of great value. It is concluded that by prevention of the normal spread of infection combined with treatment of the infected animals, mastitis can be controlled to a considerable extent.

III. A correction to the author's previous article [(1931). *Zlb. Bakt. I. (Orig.)* **120**. 291.]. *Bact. lipolyticum* Evans, 1916 (not *Bact. lipolyticum* Huss, 1907) is a gram-positive rod which apparently belongs to the corynebacteria. It should be renamed if not identical with any corynebacterium already described.

A. W. STABLEFORTH.

STECK, W. (1932). Studien zur Galtbekämpfung. Ueber den Einfluss von Reizen auf die chronische katarrhalische Streptokokkenmastitis. [**Studies on the Control of Mastitis. On the Influence of Irritants on chronic Catarrhal Streptococcal Mastitis**].—*Arch. wiss. prakt. Tierhkl.* **64**. 300-328. 15 tables. [13 refs.]

The author has studied the effect of a series of irritants on the streptococcal content of the secretion of cows affected with mastitis. Nine animals were used and during the critical periods of the experiments a bacteriological examination of each quarter was made daily; 0.5 c.c. of fore milk, taken with aseptic precautions or, if necessary, dilutions of this were sown into agar containing 2 per cent. dextrose and 5 per cent. of horse serum.

The irritants tested were oil of camomile, metacresol chlormetacresol and wood tar. The vehicle chosen was liquid paraffin, a substance to which the udder tissues were indifferent; the volume of the injection was usually 500 c.c.

The results are given in tables which occupy many pages and show that, by the means described, a diseased quarter excreting large numbers of streptococci could be rendered clinically normal and the streptococci reduced to a very small number, two or less per c.c., but that, seemingly, in no case could a quarter be permanently freed of streptococci. Sooner or later a relapse occurred, often nearly immediately after the cessation of the irritation. In the case of micrococci the results were more permanent.

The author also notes that the numbers of streptococci present during a latent infection may be so small that they are not detected when 1.0 c.c. or more of milk are examined.

A. W. STABLEFORTH.

ZIEGER, K. (1932). Beiträge zur Streptokokkenmastitis. [**Contributions on Streptococcal Mastitis**].—*Deuts. tierärztl. Wschr.* **40**. 17-21 and 39-42. 2 tables. [24 refs.]

The author's observations were made in two herds each containing about 60 to 80 head, of "Allgäuer" and "Ostfriesien" breed respectively. At the first examination of the "Allgäuer" herd, 43 out of 78 animals were affected with mastitis, due in all cases save one to *S. agalactiae*, and during the course of the succeeding year the number of affected increased to 52. Of 10 animals purchased outside and 14 home-bred heifers which were added to the herd during the same period, 6 became affected, 3 of these being heifers. Before the end of the year, 18 cows had been disposed of on account of streptococcal mastitis. The course of the disease in the herd of East Friesians was equally serious.

From a comparison of the value of fore milk, mid milk, and the last strippings of 10 healthy animals and of 11 affected with mastitis, it is concluded that the strippings are the best indicator of changes in the cell count, sediment, and chloride content. By cultural methods, however, no distinction was evident and, on account of the difficulty of ensuring actual strippings, the author recommends the use of fore milk for all tests.

Attention is drawn to the difference in the average chloride content of the milk from the healthy cows of the two herds. In the East Friesian herd it was on an average 0.02 per cent. higher. In both, variations were great and it is concluded that the chloride content is unreliable as an indicator of mastitis.

The author stresses the improvement which may take place in an infected udder during the dry period and gives details of the time which elapsed between

calving and excretion of streptococci in 94 affected animals; the periods varied from one month in 5 animals to six months or a whole lactation in 4 others.

It is believed that hereditary factors play a part in resistance to mastitis, and in support of this view charts are given of two families kept under apparently similar conditions: in one, which consisted of 8 animals of 4 generations, no mastitis occurred; in the other, which contained 9 animals of 4 generations, every animal became affected.

A. W. STABLEFORTH.

SMITH, Theobald. (1931). **Spontaneous and induced Streptococcus Disease in Guinea Pigs. An Epidemiologic Study.** Second Lecture. William Henry Welch Lecture.—*Internat. Clin.* 3. (Ser. 41). 276-297. 2 figs., 2 tables. [4 refs.]

The author describes an epidemiological study of a disease of guinea pigs which was due to a capsulated streptococcus, and had been recognized since 1907. From 1918 to 1926 it was allowed to develop in a restricted breeding group and under these conditions tended to die out, the spontaneous disease occurring chiefly in the form of suppurating lymph nodes; mortality was low. Pus from this chronic bubonic type, when inoculated into guinea pigs from another population, previously unexposed, produced a pyaemic or septicæmic, acute and fatal disease.

There was some indication that the offspring of mothers which had been chronically infected possessed enough passive resistance to restrict early infection to the bubonic type.

Intraperitoneal injection of the streptococcus produced a viscid exudate, which, when heated, proved to be a better vaccine than killed cultures. Pus from chronic cases contained cocci which were probably in a resting or lag state; pus from acute fatal cases showed no lag. A gradual reduction of virulence occurred in cultures.

A. W. STABLEFORTH.

GROSSMANN, H. (1931). Ueber Streptokokkenbefunde bei "normalen" weissen Mäusen. [**On Streptococci in normal White Mice**].—*Klin. Wschr.* 10. 551. [1 ref.]

Twenty normal mice were examined. In four of them streptococci were found; in three cases in heart blood, spleen and liver respectively, and in one case in both heart blood and spleen. No bacteria were obtained from either of these tissues in eight mice, but in the remainder various organisms were found. Strict precautions were apparently used to exclude contaminants and in each case a tube of glucose broth was left open during the period occupied by the examination; none of these tubes showed growth.

A. W. STABLEFORTH.

GAY, F. P., & ORAM, Florence. (1931). **Streptococcus leucocidin and the Resistance of Clasmatoocytes.**—*Proc. Soc. Exp. Biol.* 28. 850-851. [4 refs.]

These authors conclude from their studies that streptococcus leucocidin is distinct from haemotoxin, because it is often absent in haemolytic streptococci, because in contrast to haemotoxin it continues to increase in inoculated broth for

at least 48 hours and remains for several days, and because it resists heating at 65° C. for an hour whereas haemotoxin is destroyed by heating at 56° C. for half an hour. It may also be concentrated by evaporation at a moderate temperature and filtered through porcelain candles.

They also believe that tissue macrophages are superior to polymorphonuclear leucocytes in resisting streptococcus infection. Using the methylene blue bioscopic test of NEISSER and WECHSBERG to determine the respiratory activity of leucocytes, they have found that a 3-day pleural exudate from the rabbit, containing 50 per cent. clasmatocytes, reduces methylene blue 2 to 4 times as well as a 24-hour exudate which is largely composed of polymorphs, and that a given number of clasmatocytes resists destruction by leucocidin in a dosage that completely abolishes the respiratory activity in an aliquot portion of polymorphs.

A. W. STABLEFORTH.

MCCASH, Margaret S. L. (1931). **The Constancy of the Cultural Reactions of the Streptococci on Holman's Carbohydrate and Blood Agar Media: A Contribution to the Classification of Streptococci.**—*Glasgow Med. J.* **116**. 163-181. [42 refs.]

Eight strains of haemolytic streptococci and ten strains of non-haemolytic streptococci were subcultivated in agar stab cultures at intervals during a period varying from six weeks to nine months. They were tested on blood agar and in serum broth media containing lactose, mannite and salicin respectively, on several occasions, usually five.

According to Holman's classification, five of the haemolytic strains were *S. pyogenes*, two *S. equi* and one strain *S. anginosus*: the non-haemolytic strains were *S. mitis* or *S. salivarius*. It was found that the action on blood agar remained constant: that, in the case of the haemolytic streptococci, the action on the carbohydrates was unaltered: but that five of the non-haemolytic strains regarded as *S. mitis*, were inconstant in their action towards salicin, whilst one changed in its action on mannite.

A review of the literature is given.

A. W. STABLEFORTH.

- I. ARMSTRONG, R. R. (1932). **Immediate Pneumococcal Typing.**—*Brit. Med. J.* 30th Jan. 187-188. [2 refs.]
- II. LOGAN, W. R., & SMEALL, J. T. (1932). **A Direct Method of Typing Pneumococci.**—*Ibid.* 188-189. [2 refs.]
- III. SCHMIDT, G. W., & MISLAP, E. G. (1931). **Pneumokokkentypen in der Schweiz. [Types of Pneumococci in Switzerland].**—*Zlb. Bakt. I. (Orig.)*. **122**. 409-418. 5 tables. [15 refs.]

I & II. Both deal with attempts to type pneumococci by mixing sputum directly with specific sera. No actual agglutination occurs, but positive reactions are recognized because the pneumococci appear larger and have a ground glass appearance with a highly refractive peripheral zone. Positive results were confirmed by mouse inoculation.

Logan emphasizes the fact that the method is by no means always successful and needs experience.

III. The types of pneumococci present in 129 cases of croupous pneumonia and 45 cases of bronchopneumonia are given. In the latter series types I and II

were relatively rare, whilst group IV strains formed 53 per cent. A report is given of 161 strains from other sources. Differences due to sex and to seasonal or yearly influences are discussed.

A. W. STABLEFORTH.

- I. PRESCH, L. (1931). Ein Beitrag zur Züchtung des bovinen Tuberkelbazillus auf Einährböden und zur Frage der Eignung dieses Verfahrens beim Tuberkulosestillungsverfahren. [**A Contribution to the Cultivation of Bovine Tubercle Bacilli on Egg Media and to the suitability of these Methods to the Tuberculosis Eradication Campaign**].—*Zeitschr. Infektkr.* **40**, 137-145. 5 tables. [11 refs.]
- II. JONTOSOHN, K. (1931). Versuche zur Züchtung von Tuberkelbazillen aus dem Blute bei Tuberkulösen. [**Experiments on the Cultivation of Tubercle Bacilli from the Blood in Tuberculous Patients**].—*Zeitschr. Tuberk.* **61**, 35-41. [28 refs.]
- III. POLLAK, O. J. (1931). Züchtung von Tuberkelbazillen. [**Cultivation of Tubercle Bacilli**].—*Med. Klin.* **27**, 1146-1150. [48 refs.]

I. Comparative cultural experiments were made with sixty samples of mucus which by microscopic examination were classed as rich, moderately rich or poor in tubercle bacilli. Fifty-six were from the lungs and four from the uterus.

The best results were obtained in Besredka's liquid egg medium containing malachite green. Of the solid media, Lubenau's egg was unsatisfactory and Hohn's haematin medium somewhat less so, whilst the media put forward by Sickmüller and Petragani gave good results; both these contain malachite green. It is concluded that material for culture should be treated with 15 per cent. hydrochloric acid and that both solid and liquid media should be used; but that, in the tuberculosis eradication campaign (Ostertag's method), although cultural methods often give earlier positive results, animal inoculation should also be used.

In these experiments five tubes of each medium were seeded with each sample. Many tubes failed to give positive results or were contaminated and it is suggested that at least three tubes should always be used.

II. In 41 cases of pulmonary tuberculosis and 9 cases of surgical tuberculosis, blood cultivation experiments were made according to Löwenstein's method. In only 3 of the pulmonary cases was cultivation successful; the growth was scanty and only detected by microscopic examination. It is suggested that, even in severe cases, tubercle bacilli are not numerous in the blood and are perhaps attenuated.

III. Pollak notes the difficulty of preparing Löwenstein's medium and gives full details collected by himself in Löwenstein's laboratory. He concludes that the medium is specially suited to the growth of tubercle bacilli because, on an average, growth appears after 10 days, and after 1 or 2 subcultures in 3 to 4 days. However, his results on haemoculture did not confirm Löwenstein's.

A. W. STABLEFORTH.

- NOHLEN, A., & SARVAN, M. (1931). Studien über Tuberkulose. VIII. Einfluss der BCG-Impfung auf das Blut und Versuche, eine Virulenzsteigerung des BCG durch experimentelle Schädigung der Versuchstiere (*Macacus rhesus*) zu bewirken. [**Studies on Tuberculosis. VIII. The Influence of BCG on the Blood and Attempts to induce an Increase of Virulence by**

Experimental Damage of the Test Animal (*Macacus rhesus*).—*Beitr. Klin. Tuberk.* 78. 250-263. 5 tables. [15 refs.]

The average total and differential leucocyte counts and the erythrocyte sedimentation times were determined from an examination of thirteen rhesus monkeys. The effect of BCG was then investigated.

Subcutaneous or intraperitoneal injection lead to a relative increase of leucocytes, a simultaneous decrease of lymphocytes and a slight monocytosis. These symptoms were in general reversible.

Removal of the spleen, or injection of tuberculin or benzene led occasionally to an increase in these phenomena. In three monkeys a slight increase in the virulence is reported. One other monkey died forty-nine days after intraperitoneal injection of 25 mg. of BCG. A caseous lesion was found at the site of injection, caseated lesions in the omentum, liver, spleen and glands of the abdomen, and in the lungs. Transference to guinea pigs and rabbits resulted in progressive tuberculosis. This case is believed to show that BCG can in certain circumstances undergo a considerable increase of virulence and lead to the death of the inoculated animal.

A. W. STABLEFORTH.

NASTA, M., JOVIN, I., & BLECHMANN, M. (1931). Importance de la durée des irradiations et de la dose de virus inoculée, dans la production de la maladie toxique déterminée par le virus tuberculeux filtrable chez le Cobaye irradié par les rayons X. [**The Importance of the Duration of Irradiation and the Dose of Virus inoculated in the Production of the Toxic Disease caused by inoculating the Filtrable Virus of Tuberculosis into Guinea Pigs exposed to X-Rays**].—*C. R. Soc. Biol. Paris.* 107. 847-848.

NASTA, M., JOVIN, I., & BLECHMANN, M. (1931). Transmission par passage de la maladie toxique mortelle déterminée par le virus tuberculeux filtrable chez le Cobaye exposé aux rayons X. [**Transmission by Passage of the Fatal Toxic Disease caused by the Filtrable Virus of Tuberculosis in the Guinea Pig exposed to X-Rays**].—*Ibid.* 849-851.

The authors have shown that the toxic effect of X-ray exposure on guinea pigs inoculated with the filtrable virus of tuberculosis is due to constituents of the filtrable virus and not to toxic pathological substances present in the suspension used. They have also shown that three irradiations of a given intensity and duration are necessary to cause death with certainty; a smaller exposure gives variable results owing to individual animal susceptibilities. The average amount of leucopenia obtained was between five and six thousand leucocytes per c.mm. The greater the dose of virus inoculated, the quicker death followed on exposure.

They carried out a controlled experiment on a number of guinea pigs, by means of which they were able to passage this toxic disease; it was also noted that this method of irradiating the primary animals increased the number of acid-fast bacilli and increased the tendency to a return to typical tuberculous lesions in the passage animals whether they were or were not themselves exposed to the X-rays.

NORMAN HOLE.

FELDMAN, W. H. (1931). The Histology of Experimental Tuberculosis in Different Species.—*Arch. Path.* 11. 896-913. 11 text figs. [7 refs.]

This investigation was conducted to determine whether the anatomical nature of tuberculosis in a given animal differs according to the type of organism respon-

sible for the lesions, or whether the tuberculous lesions are similar regardless of the source of the organism. The observations were confined to the chicken, guinea pig, rabbit, and the dog.

Tuberculous infection induced by any of the three types of tubercle bacillus in the tissues of the chicken was characterized by the appearance of definitely focal circumscribed collections of monocyctic or epithelioid cells of a large clear type. The lesions, which were often multiple, sometimes became confluent but, although a conglomerate tubercle resulted, the identity of the separate follicle-like masses of epithelioid cells was discernible.

It was not possible to provoke demonstrable tuberculosis in the guinea pig by the avian type either by subcutaneous or intraperitoneal inoculation. Intracerebral inoculation yielded positive results. The three types of bacilli produced lesions morphologically identical. The lesions were characterized in the earlier stages by diffuse masses of monocytes dispersed irregularly. Fibrosis was not observed and necrosis without calcification finally changed the character of many of the separate cellular accumulations.

The lesions in the rabbit following the production of the disease with the three different types were without significant differences. They were characterized by the formation of irregular masses of epithelioid cells and the central portion of many became caseated; giant cells were numerous and encapsulation was not apparent.

Dogs proved resistant to the avian form of the bacillus by every route of exposure except inoculation into the brain. Infection established in this way produced lesions in the brain, spinal cord, liver and spleen, but not in the lungs [see also FELDMAN this *Bulletin*, 1. 101]. The human and bovine strains on the other hand set up lesions in the lungs besides those in the liver, brain and spleen. The lesions produced in the brain and liver by each of the three types of bacilli were found to be alike, except for differences perhaps due to anatomical peculiarities of the involved organs.

The author concludes that variations in the character of the reaction of the tissue to *Mycobacterium tuberculosis* are not determined by the type or organism *per se*, but by certain indefinite factors which are inherent in the species possessing the infection.

J. R. M. INNES.

GRIFFITH, A. S., & MUNRO, W. T. (1932). **The Relative Incidence of the Human and Bovine Types of Tubercle Bacilli in Human Tuberculosis in Scotland.**—*J. Path. Bact.* 35. 271-281. 3 tables. [11 refs.]

RAW, N. (1932). **Human and Bovine Tuberculosis. The Question of Mutation of the Tubercle Bacillus.**—*Brit. Med. J.* 27th Feb. 377-378. [6 refs.]

Previous enquiries have indicated that, in cases of bone and joint tuberculosis, the bovine type is relatively more frequent in Scotland than in England.

Griffith and Munro report the results of investigations made in Scotland to determine the proportional incidence of the human and bovine types of tubercle bacilli in different forms of human tuberculosis. In the first series of cases from the south-western counties cultures were obtained from 27 specimens—2 of scrofuloderma and 25 of bone and joint tuberculosis. The latter fell into 2 groups; from 14 cases they were eugonic and of the human type, while from 11 cases they were dysgonic and identical with tubercle bacilli of the bovine type. The 2 strains from scrofuloderma were of the human type.

In the second series from the eastern counties, 50 cases of bone and joint lesions were examined (17 of these have already been reported by MUNRO and CUMMING). Of these, 37 were eugonic and were classified as of human type without confirmation by animal tests. The remaining 13, which were dysgonic, were tested on rabbits; 11 produced the rapidly fatal generalized tuberculosis of standard bovine strains, while 2 gave rise to progressive tuberculosis of a less severe type than is usual with standard strains. The percentage of bovine infection for the age periods (a) under 5 years, (b) 5 to 14 years and (c) over 15 years, were 44.4, 21.4 and 22.2 respectively.

The authors have examined the bronchial glands from 52 children under 10 years of age. Cultures were obtained from 46 of which 36 were eugonic and 10 were dysgonic. The latter caused generalized fatal tuberculosis in rabbits and were, therefore, classified as typical bovine. Of the 9 eugonic strains which were tested on rabbits, 2 produced typical chronic bovine tuberculosis. Cultures obtained from these animals were dysgonic and fully virulent. The strains from these 2 cases were, therefore, mixtures of human and bovine bacilli.

Details are also given of 3 additional instances of bovine tubercle bacilli isolated from the sputum of phthisical persons and these bring the number of reported cases in Great Britain up to 24, 3 in England and 21 in Scotland.

Finally, the results of investigations into other forms of tuberculosis are recorded. A table indicating the number of cases of each variety and the proportion infected with the bovine type shows the following percentages for all ages:—cervical glands 73.6; bone and joint 42.8; genito-urinary 9.1; lupus 53.8; meningeal 13.3; pulmonary 3.8; autopsies 31.3 and miscellaneous 77.8.

Raw holds the opinion that bovine tubercle bacilli introduced into the human body in infancy may, after many years' growth in the new environment, undergo mutation and become human bacilli. In support of this contention he advances the case of a man who, when 5 years of age, suffered from a tuberculous adenitis. The glands on one side of the neck were removed: on the other side they remained indurated until the age of 48 when they became active and suppurated. At the same time a pulmonary tuberculosis developed. Both the sputum and the pus from the neck glands, examined by cultural and animal inoculation methods, yielded organisms typical of the human strain.

R. E. GLOVER.

MÜLLER, M. (1931). Zur Verwendbarkeit von Flockungsreaktionen bei der Diagnose der Rinder- und Geflügeltuberkulose. [**On the Usefulness of Flocculation Reactions in the Diagnosis of Bovine and Avian Tuberculosis**]. —*Tierärztl. Rdsch.* 37. 705-707. [19 refs.]

The author employed the MATEFY and the DARANYI reactions in the diagnosis of tuberculosis in numerous cattle and fowls and found them useless for this purpose.

J. E.

DAINES, L. L., & AUSTIN, H. (1932). A Study of so-called Skin-Lesion and No-Visible-Lesion Tuberculin-Reacting Cattle.—*J. Amer. Vet. Med. Ass.* 80. 414-436. 1 table. [40 refs.]

During the years 1927-1931, the number of cattle in Utah, which were tuberculin-tested, was 432,758. In this period, 3,313 reactors were slaughtered, and lesions were found in the skin in 1,681 cases, as compared with 303 udder and 254 systemic lesions: in 1,090 instances no lesions were found.

It is noted that of late years there has been a marked relative increase in the number of skin-lesion and no-lesion reactors, particularly in herds which for some time have been tuberculosis-free as indicated by the tuberculin test: moreover, it has been reported that these cases often react best to the intradermal test and may fail to respond to the subcutaneous and ophthalmic methods. This paper embodies the results obtained in the study of the lesions from 211 such animals.

The nodules were mainly subcutaneous, but sometimes involved the skin. They varied from the size of a pin's head up to that of a hen's egg and were made up of granulation tissue which, in some instances, contained necrotic or calcified centres. Cultures which were obtained from the lesions on a modified Petroff medium without glycerine fell into three groups viz. (1) a typical bovine strain of full virulence, obtained from one animal only, which killed guinea pigs in about 18 days; (2) organisms exhibiting certain degrees of acid-fastness and producing colonies which were generally chromogenic in 24 to 48 hours; (3) strains in which from 90 to 100 per cent. of the organisms were acid-fast; the colonies were deep orange and appeared in about seven weeks.

The majority of the cultures belonged to group 2. Strains corresponding to this group were also isolated from the kidneys of several tuberculin-reacting cattle with or without visible lesions. Morphologically the organisms pertaining to groups 2 and 3 were coccoid or diphtheroid in appearance and showed a close similarity to the Preisz-Nocard bacillus. Inoculation of the cultures into guinea pigs resulted in death in periods ranging from 14 to 235 days. The inguinal glands were enlarged and the organisms were recovered from these glands and from the heart blood and kidney. Intraperitoneal inoculation led to the formation of testicular abscesses. In no case, however, were lesions typical of tuberculosis produced.

Eight cows were inoculated subcutaneously or intracutaneously with various strains or combinations of strains; in some instances, nodular swellings resembling very closely in appearance typical spontaneous skin lesions developed, from which the organisms were recovered in culture. One animal inoculated with a group 2 strain subsequently died and the *post-mortem* examination revealed multiple necrotic lesions in the liver, heart muscle and kidneys. A second cow inoculated subcutaneously with a large dose of an authentic Preisz-Nocard strain also succumbed and showed multiple abscess formation in the liver. Many of these animals gave a typical intradermal reaction to tuberculin.

It is suggested that the organisms probably gain entrance through wounds in the skin. In three of the subcutaneous lesions from which cultures were obtained, the larvae of ox warbles were observed and they must be considered as possible vectors of the infecting organisms. It is pointed out that Preisz-Nocard infection is very common in old ewes in Utah and that the organism has also been recovered from the droppings of apparently healthy sheep.

It is significant that the cultivation of the Preisz-Nocard bacillus on inspissated egg-yolk and in milk resulted in the production of fairly large numbers of acid-fast organisms. It is postulated that relatively small aggregates of these organisms entering into wounds may, in the presence of the subcutaneous fat, develop acid-fast properties and stimulate a tuberculin hypersensitiveness.

In the discussion which followed the paper, TRAUM, while admitting that a very small percentage of skin lesions had proved to be tuberculous, was unwilling to accept the suggestion that the remainder must also be due to an infection of this nature. He thought that in the light of present knowledge a reaction to tuberculin and the demonstration of acid-fast organisms did not necessarily indicate a

tuberculous infection. He reported that approximately 1 per cent. of his cases in Californian cattle were attributable to a Preisz-Nocard infection.

DAY stated that he had not succeeded in isolating from the skin nodules the organisms which were responsible for the lesions. He had found that the histological changes were typically tuberculous with small-celled infiltration, giant-cell formation and necrosis.

R. E. GLOVER.

GERLACH, F. (1931). Tuberkuloseschutzimpfung. [Vaccination against Tuberculosis].—*2me. Congrès internat. Path. comp.* pp. 17-32.

This is a concise and reasoned presentation of the salient facts which have been demonstrated in connection with BCG vaccination and will repay reading in the original.

The author's conclusions may be summarized as follows. BCG is nearly but not completely avirulent: lesions are produced and are in the early stages of their generation transmissible from animal to animal, but they are mild and regressive: the pathogenicity—as distinct from the virulence—can occasionally be raised by passage in small animals. The author takes the view that the alterations brought about by cultivation on media other than that recommended by CALMETTE and GUÉRIN are of subsidiary importance. BCG is completely non-pathogenic for bovines. Unfortunately the vaccinated animal becomes allergic for a period which varies with the dose. In order to minimize this difficulty the author, in accord with BERGER and FRENKEL, proposes a distinctive mark to indicate vaccination and the date.

From the results of the author and those of most other workers amongst whom are mentioned particularly GUÉRIN, ASCOLI, BUXTON and GRIFFITH, it is concluded that vaccination with BCG undoubtedly confers resistance, but that it is not yet possible to assess its degree accurately. Field results, however, carried out under conditions that were not ideal have indicated a useful degree of protection.

A. W. STABLEFORTH.

TIEDEMANN, H. J., & SCHNIEDER, E. A. (1931). BCG-Schutzimpfungsversuche an Meerschweinchen. [Experiments on Protective Inoculation of Guinea Pigs with BCG].—*Beitr. Klin. Tuberk.* **78**, 1-12. 6 figs. 2 tables.

Ninety healthy tuberculin-negative guinea pigs weighing about 450 g. were given three subcutaneous injections of BCG at weekly intervals. The material for inoculation was grown on glycerine potato for 17 to 26 days; the doses were 2 mg., 2 mg., and 0.5 mg., respectively. Twelve animals were lost from inter-current disease before immunity tests were made.

Sixty days after the first dose of BCG, the remaining 78 animals, all of which had lost weight but in which the inoculation lesions had partially or completely disappeared, were divided into four groups. The animals of the first group and 15 controls were given subcutaneously 0.001 mg. of a virulent bovine culture. None of the treated animals was fully protected, but generalization was delayed and the course apparently mild. The animals of the second group were given 0.000,05 mg. In the tabulated results only those animals which lived over 100 days are considered. Of 8 controls, 6 developed generalized tuberculosis, one remained perfectly healthy and one died after 129 days with tuberculosis of the lymph glands only. Of 8 animals which had previously received BCG, 6 remained

healthy whilst 2 developed generalized disease. In the other two groups the test dose of virulent organism was not large enough. Intercurrent disease accounted for the death of a large number of animals.

It is concluded that in general there was a distinct difference in the tissue reaction which in the treated animals showed itself clinically in the more rapid development of the lesion at the site of the test injection and a decrease or absence of disease of the lymph glands. The question whether there is an association between persistence of the BCG lesion and protection could not be answered.

A. W. STABLEFORTH.

- I. TONNEY, F. O., & NOBLE, R. E. (1931). **The Direct Count of Colon-Aerogenes Organisms: Its Possibilities and Promise.**—*J. Infect. Dis.* **48**, 413-417. 2 tables. [8 refs.]
- II. O'MEARA, R. A. Q. (1931). **A Simple Delicate and Rapid Method of Detecting the Formation of Acetylmethylcarbinol by Bacteria Fermenting Carbohydrate.**—*J. Path. Bact.* **34**, 401-406. [2 refs.]
- III. PIEN, J., & BAISSE, J. (1931). **Sur la numération directe des microbes du lait. [On the Direct Count of Organisms in Milk].**—*Le Lait*. **11**, 705-711.

I. By using cyanide citrate agar medium the authors have determined the separate *B. coli* and *B. aerogenes* counts for faecal material, soils, grains and decayed vegetation. They consider that, while the presence of *B. coli* in water is definite evidence of faecal pollution, the importance of *B. aerogenes* is doubtful; its presence probably indicates surface wash contamination as it has a wide distribution in nature.

II. In the processes of fermentation certain bacteria form acetylmethylcarbinol, (acetoin) which in turn is reduced to a butyl glycol. The author has introduced a new and more rapid test for acetoin in which he grows the organism for 24 hours in a modified KOSER'S medium, and then adds creatin in the presence of strong alkali. If acetoin is present a red coloration results. The addition of sodium fumarate to the culture medium was found to improve the test by delaying the reduction processes which normally break down the acetoin.

III. The addition of calcium chloride was found to be a valuable adjunct in the preparation of a homogeneous and adherent milk smear. The authors consider the most satisfactory method of making a direct count to be the spreading, drying and staining of a known amount of milk on a known area, followed by a microscopical count.

NORMAN HOLE.

- BULLARD, J. F. (1931). **The Value of Sterile Bacterial Suspensions and Sterile Broth Cultures in preventing the Development of Lesions in Small Pigs attributable to *Salmonella suipestifer*. A Preliminary Report.**—*J. Amer. Vet. Med. Ass.* **79**, 631-634. [1 ref.]

The author carried out experiments to determine if any protection could be conferred on young pigs against *S. suipestifer* infection by the subcutaneous inoculation of a phenolised saline suspension or by the feeding of formolised broth cultures of the organism.

Seventeen pigs aged four weeks old were divided into three groups :—

GROUP I.—Three pigs each received 20 c.c. live culture and two pigs were left untreated.

GROUP II.—Six pigs were each given varying doses (5 c.c. to 20 c.c.) of phenolised saline suspension of *S. suispestifer*.

GROUP III.—Two pigs were each given 50 c.c. and four pigs were each given 75 c.c. of a formalised broth culture of *S. suispestifer*.

It was found that the injection of phenolised saline suspensions was the most rapid method of producing agglutinins for *S. suispestifer* while the feeding of formalised cultures was variable in its action.

Both the injection and the feeding of killed cultures of *S. suispestifer* appeared to confer a considerable degree of protection against a subsequent feeding with living cultures of the same organism.

T. M. DOYLE.

- I. BUNYEA, H., & HALL, W. J. (1932). **The Relation of Agglutination Reaction to Salmonella pullorum Infection in Hens, and Observations on the Diagnostic Efficiency of Test Methods.**—*J. Amer. Vet. Med. Ass.* **80**. 491-496. 2 figs. [2 refs.]
- II. LEYNEN, E., & WILLEMS, R. (1932). La diarrhée blanche bacillaire. Contribution à l'étude de la recherche des porteurs de germe par l'agglutination et la pullorination. [Bacillary White Diarrhoea. Detection of "Carriers" by the Agglutination and Pullorin Tests].—*Ann. Méd. vét.* **77**. 49-70. 4 figs., 3 tables. [14 refs.]

I. Bunyea and Hall carried out comparative tests between the standard tube agglutination test and the stained-antigen, rapid whole blood agglutination test.

Two hundred and six hens were tested and there was an agreement of 91 per cent. between the two tests.

The tube method detected 143 and from 114 of these (80 per cent.) *S. pullorum* was isolated from the ovary. The standard-antigen, rapid whole blood method detected 135 reactors and from 112 (83 per cent.) *S. pullorum* was isolated from the ovary.

II. Leynen and Willems discuss the relative diagnostic values of the tube agglutination test and the "pullorin" test for the detection of fowls infected with *S. pullorum* and they state that the tube test is the more accurate.

They refer to a recent publication on the same subject by LAHAYE [see this *Bulletin*, **2**, 323.] who claimed to have obtained more accurate results with the "pullorin" test than with the tube method, but this is contrary to the experience of Leynen and Willems.

For the past two years, they have used the rapid (plate) agglutination test and they consider it to be more accurate than the tube method. They give details of the preparation of the antigen and of the precautions which should be taken in carrying out the test.

According to Leynen and Willems, fowls infected with *S. pullorum* do not react to any of the diagnostic tests until *after* sexual maturity. [This contention is contrary to general experience].

T. M. DOYLE.

- CASH, J. R., & DOAN, C. A. (1930). **Spontaneous and Experimental Infection of Pigeons with *B. aertrycke*.**—*Proc. Soc. Exp. Biol. New York*. **28**. 235-238.

The authors report that, while studying blood formation in pigeons rendered

anaemic by fasting, they observed among some of the pigeons a marked leucocytosis (60,000 to 187,000 cells per c.mm.) and the appearance of myelocytes (2 to 70 per cent.).

Seven of the birds became acutely ill, developed a severe anaemia and died within a week.

A bacteriological examination was made of four of these birds and from the blood and organs a small gram-negative bacillus was isolated which was identified as *B. aertrycke*.

Cultures of this organism when inoculated intraperitoneally into pigeons induced a disease similar in all respects to that observed in the anaemic birds.

Four out of seven pigeons fed with broth culture of the organism died in from 9 to 27 days. A marked myeloid hyperplasia of the bone marrow and extensive infiltrations of myelocytes throughout the liver and kidneys was found on autopsy. In each case *B. aertrycke* was isolated in pure culture from the liver.

Berkefeld VV filtrates of 24 hour old broth cultures of the organism had no appreciable effect when fed in 2 c.c. doses to normal pigeons.

T. M. DOYLE.

JORDAN, C. F., & BORTS, I. H. (1931). **Double Infection by Organisms of the Brucella Group. Report of a Case.**—*Publ. Health. Reps. Washington*. **46**. 2437-2443. 1 chart. [10 refs.]

Two strains of brucella were isolated at Iowa from the blood of a labourer, aged 30 years, who had recently come from Mexico. One, which was obtained from a plate which had been incubated under atmospheric conditions, proved to be *Br. melitensis*. The other, isolated from a plate which had been incubated under 10 per cent. carbon dioxide tension, was of the *abortus* variety. The results of the author obtained by means of the dye method and inoculation of guinea pigs were confirmed by other workers using the agglutinin absorption method (Francis) and the dye method (Huddleson).

The agglutination titre of the patient's serum for *Br. melitensis* varied from 1:320 to 1:1,280.

It is believed that the *Br. melitensis* infection was acquired in Mexico where it is known to be endemic. The source of the *Br. abortus* was not clear.

A. W. STABLEFORTH.

I. SCOTT, W. (1931). **Bovine Abortion and Vaccination.**—*Vet. Rec.* **11**. 550-551.

II. JAMES, W. A., & GRAHAM, R. (1931). **The Therapeutic Value of Brucella abortus Bacterin administered intravenously.**—*J. Amer. Vet. Med. Ass.* **79**. 391-392. 1 table.

I. Scott discusses the immunizing value of abortion vaccine. He claims excellent results from the use of a polyvalent vaccine; four injections are given, the first three consisting of dead vaccine and the fourth of an attenuated vaccine [method of attenuation not stated].

II. James and Graham carried out an experiment to test the accuracy of the claim that the repeated intravenous injection of *Br. abortus* bacterins into cows which give a positive reaction to the agglutination test will eventually render them negative to the test.

Ten reacting cows were each given three successive injections (2 c.c., 3 c.c. and 4 c.c.) of the bacterin at weekly intervals and no evidence was found that the injections caused any appreciable alteration in the agglutinin content of the blood or milk over a period of six months.

T. M. DOYLE.

- I. KNOTH, M. (1931). Ueber den indirekten Nachweis der Bangschen Abortus-bakterien in Milch. Sammelreferat. [**On the Indirect Detection of *Br. abortus* in Milk. Review.**].—*Zeitschr. Fleisch- u. Milchhyg.* **41**. 501-505. [62 refs.]
- II. BETZEN. (1931). Der Abortus Bang-Bazillus und das Reichsmilchgesetz. (R.M.G.). [***Br. abortus* and the Milk Laws (Germany)**].—*Molk. Ztg.* **45**. 201-202.

I. Reference is made to the literature regarding the incidence of *Br. abortus* in graded milk, the occurrence of infection in children, and the relation of the agglutination titres of blood serum and whey respectively to excretion of *Br. abortus* with the milk. The author accepts GILMAN's conclusion that a whey titre of 1 : 80 or above is indicative of the probability of excretion of brucella.

II. The author briefly discusses the actual and legal position in regard to *Br. abortus* under the laws relating to milk in Germany.

A. W. STABLEFORTH.

- I. NAGEL, W. (1931). Uebertragung der Banginfektion vom Schwein auf den Menschen. (Ein Beitrag zur Epidemiologie und Klinik). I & II Mitteilung. [**Transmission of Bang-Infection from Pigs to Man. (A Contribution to the Epidemiology and Clinical Findings). Parts I & II.**].—*Schweiz. med. Wschr.* **61**. 970-978. 1 table. [15 refs.]
- II. BISCHOFBERGER, W. (1931). Febris undulans Bang des Menschen, übertragen durch Schweine. [**Undulant Fever in Man, transmitted by Pigs**].—*Ibid.* 978-980. [11 refs.]

I. The author describes a small outbreak of contagious abortion amongst pigs, associated with a number of cases of undulant fever, in a village of about 400 inhabitants in North-East Switzerland.

The first part of the article deals with epidemiology and the clinical features of the disease amongst the pigs. Infection apparently commenced in the late autumn of 1930 and, by the spring of 1931, out of a total of 110 sows, 60 to 70 had aborted on one or more occasions. Two boars became affected and were believed to be important factors in the spread of the disease; a third boar became impotent apparently following orchitis; newly purchased boars which were placed in an uninfected stall quickly became affected and again spread the disease. The most prominent symptom in the sows was abortion which usually occurred between the sixth and twelfth weeks of gestation. Parturition was often difficult and followed by retention of the membranes and an inflammatory condition of the genital tract which frequently led to sterility. Clinical symptoms were generally shown before abortion occurred; infected pigs were dull, fed badly and often showed leg weakness, possibly due to arthralgia. The source and type of the infection was not ascertained.

In the second part the author describes the findings in 40 of the inhabitants who were thought to have been in greatest danger of infection. Amongst these

it is believed there were ten cases of undulant fever; in only six of these was a positive agglutination result obtained. In general the symptoms were characteristic, and there was no evidence of latent infection. The exact type of the infecting organisms was not ascertained.

II. The author describes four cases of undulant fever in men who were in close contact with pigs, but who had no contact with larger animals and consumed little or no dairy products. In each case there was evidence that the herd was infected with brucella. No cultures were obtained from the human patients and the exact type of infection was therefore not ascertained.

A. W. STABLEFORTH.

HAXTHAUSEN, H., & THOMSEN, A. (1931). Brucella-Ausschlag bei Tierärzten. (Eine eigentümliche, professionelle Hautaffektion, wahrscheinlich allergischer Natur, hervorgerufen von *Bac. abortus* Bang.) [**Brucella Eruptions in Veterinarians. (A peculiar, professional Skin Affection, apparently of an Allergic Nature, evoked by *Br. abortus*)**].—*Arch. Dermatol.* **163**. 477-491. 4 plates, 1 table. [15 refs.]

Illustrations are given of a skin affection of the arm which occurs in veterinarians and others who have to deal with aborting cows and which is characterized by follicular papules accompanied by pustule formation and necrosis. Amongst 325 veterinarians who have graduated in Denmark since 1915, about 100 have become affected. The eruption is acute and shows a definite tendency to relapse each time a placenta is removed. The individual eruptions do not appear to depend on an infection of the skin with *Br. abortus*, but are seemingly of an allergic nature, due to a "toxin." In support of this, it was found that "abartin" rubbed into the skin of the arm produced a cutaneous reaction similar to that which occurred spontaneously, whereas control persons—with one exception—showed a negative result. It is supposed that the allergic condition develops as a result of an earlier infection.

The skin infections are not accompanied by any of the symptoms of undulant fever, and differ moreover in important particulars from eruptions which have previously been reported in connection with removal of foetal membranes. [The reactions described by HUDDLESON, this *Bulletin*. **1**. 10. and RIEDMÜLLER and STIHL, *Ibid.* **2**. 341, are apparently of a similar nature].

A. W. STABLEFORTH.

WOLTERS, K. L. (1932). Versuche zur Feststellung von Wechselbeziehungen zwischen Rauschbrand- bzw. Pararauschbrand bacillen vom Rind und Schaf. [**Experiments to determine the Variability between "Blackleg" and "Para-Blackleg" of Cattle and Sheep**].—*Arch. wiss. prakt. Tierhkl.* **65**. 94-99. [3 refs.]

In middle Germany the incidence of "blackleg" and "para-blackleg" is peculiar. Bovine "blackleg" is a range disease and sheep in the same pasture remain unaffected, whilst ovine "blackleg" follows wound injury and is not related to the former. Bovine "para-blackleg" follows wound injury and ovine "para-blackleg" often originates internally in the abomasum ("bradsot"). The author carried out research in order to clarify the conception of these diseases.

Six strains of anaerobes isolated from each of these four diseases (24 in all) were studied by cultural methods, but could not be differentiated thereby: they were then tested for pathogenicity on guinea pigs by subcutaneous inoculation

and showed slight differences, bovine "blackleg" bacilli being more virulent than ovine "blackleg" bacilli.

Sheep were also used in the virulence tests and showed greater susceptibility for ovine "blackleg" and "para-blackleg" bacilli.

J. E.

HAUPT, H. (1932). Zur Kenntnis der Erreger zweier enzootisch auftretender Euterentzündungen der Schafe, des *Micrococcus ovis* Migula 1900 und des *Bact. ovinum* n. sp. [On the Causal Agents of two enzootic Forms of Mastitis in Sheep, *M. ovis* Migula, 1900 and *Bact. ovinum* n. sp.].—*Zlb. Bakt. I. (Orig.)*. **123**. 365-376. 2 tables. [19 refs.]

After a review of the literature Haupt describes in detail the following organisms:—a micrococcus and two strains of bacteria from cases of mastitis in sheep, two strains of bacteria from the lungs of sheep, and two strains of bacteria isolated from cases of ovine mastitis by another worker in Germany.

The micrococcus had the characters of *M. ovis* Migula 1900. The bacteria were essentially similar in cultural and biochemical characters and corresponded with *Bact. ovinum* Dammann and Freese.

Comparison showed that they were distinct from *Bact. purifaciens* Christiansen 1917 and from *Hemophilus ovis* Mitchell, 1925.

A serum prepared with one strain of *Bact. purifaciens* agglutinated that strain and another strain of the same organism to 1 : 6,400. It was used to test four of the strains of *Bact. ovinum*, but agglutinated none above 1 : 50. A serum prepared with one of these agglutinated three others to about 1 : 1,600, but neither strain of *Bact. purifaciens* above 1 : 200.

Full cultural details are given; for these the original should be consulted.

A. W. STABLEFORTH.

DISEASES CAUSED BY PROTOZOAN PARASITES.

BLAND, J. O. W. (1931). Glandular Fever II.—The Protozoal Nature of the Experimental Disease.—*Brit. J. Exp. Path.* **12**. 311-319. 4 text figs. 2 tables. [5 refs.]

In a previous paper [(1930) *Lancet*. **219**. 521], the author described a disease of rabbits which followed the inoculation of blood from a human case of glandular fever. It would appear that the organism responsible was a protozoon of the genus *Toxoplasma* closely resembling *T. cuniculi*.

In the present investigation, two such strains have been compared with an authentic *T. cuniculi*. The pathological changes produced in the rabbit by the inoculation of infective material from any of the three strains were identical and consisted of a rise in temperature accompanied by enlargement of the lymph-glands, liver and spleen with areas of necrosis in the latter organs. The glandular fever strains, however, were extremely lethal, the rabbits dying in from seven to ten days after the fall in temperature, whereas *T. cuniculi* rarely killed these animals. All three strains were infective for guinea pigs and mice.

One of the glandular fever strains was tested in monkeys and was found to be infective. The train of symptoms which followed—pyrexia, generalized swelling of the glands and a marked increase in the total number of lymphocytes in the blood—closely resembled the human disease. The author is careful to point out, however, that these protozoa have been obtained from only two cases of glandular fever and that their exact etiological significance requires further confirmation.

R. E. GLOVER,

REES, C. W. (1929). **Pathogenesis of Intestinal Amebiasis in Kittens.**—*Arch. Path.* **7**. 1-26. [26 refs.]

The author made investigations to ascertain the method of attack of *Endamoeba histolytica* on the tissues of the colon in kittens. The endamoebae were cultivated in Boeck and Drbohlav's egg slant serum medium and kittens were infected by injection into the colon after laparotomy or by rectal injection.

Lesions could not be found in less than 40 hours after laparotomy, but were often very severe by the 90th hour. Infection followed much more frequently when faeces from infected kittens were injected than when cultures were used. The first detectable ulcers found after laparotomy were usually near the ileocaecal valve. The ulcers appeared to develop by necrosis of the mucosa and were not due to the discharge into the lumen of the bowel of necrotic material from abscesses in the crypts.

The presence of bacteria complicated the picture and the author does not consider that the method of attack has been determined, but is of the opinion that the evidence suggests that the amoebae produce a cytolytic toxin which attacks the epithelial cells of the mucosa causing a response in more rapid secretion of serum and plasma. The continued attack leads to injury sufficient to cause bleeding and later to the formation of ulcers.

U. F. RICHARDSON.

TYZZER, E. E. (1932). **Criteria and Methods in the Investigation of Avian Coccidiosis.**—*J. Amer. Vet. Med. Ass.* **80**. 474-484.

This article deals with the technique employed in the investigation of avian coccidiosis.

Dealing with the isolation of individual species, it is pointed out that, although infection with single species occurs, exact knowledge of the parasite and careful experimental study are necessary to make sure that no other species is also present. Separation of two species parasitic in one host is often possible, e.g. *Eimeria acervulina*, parasitic in the upper parts of the intestine, can be separated from *E. tenella* which is usually confined to the caeca. The latter can frequently be obtained in a pure state from the caecal mucous membrane after prolonged washing. Other methods of isolation employed are the feeding of material in which the oocysts of one species only have sporulated, or collection of faeces from artificially infected birds before infection has taken place from the one with the longer period of incubation. Isolation can also be effected by placing drops of material containing oocysts on a strip of gelatin, cutting out drops containing single oocysts and feeding to clean birds. This method is unsatisfactory when the species required is present in a great minority.

Evidence is brought forward to demonstrate that size is an unreliable criterion of species.

When animal experiments are employed for investigation the chief hindrance is accidental infection, but this can be avoided by purchasing day-old chicks, furnishing them with sterile equipment, sterilizing all food material, and keeping in a separate room with a separate attendant from the infected birds, care being taken that the room is free from vermin. The provision of wire floors was not found to prevent the spread of infection, but moving infected chicks into sterile cages every 24 hours effectively checked the progress of the disease, when detected at its inception.

Microscopic examination as a means of detecting the presence of small numbers of oocysts proved less reliable than feeding of the infective material to birds.

In this connection it is pointed out that when experiments have been performed to attempt infection with oocysts from different host species, no account has been taken of the fact that the donor may harbour, in its intestinal tract, oocysts other than its own species, and that these may not have been detectable by microscopic examination of the material used.

R. S. ROBERTS.

CHODUKIN, N. J., SOFIEFF, M. S., SCHEVTSCHENKO, F. J., & RADSIVILOVSKIJ, G. L. (1931). *Phlebotomus* als Uebertrager von Hunde-Leishmaniose. [**Phlebotomus as the Carrier of Canine Leishmaniasis**].—*Arch. Schiffs- u. Tropen-Hyg.* **35**. 424-434. 2 figs., 3 tables.

The authors describe a successful transmission experiment in which canine leishmaniasis was transmitted by *Phlebotomus papatasi* or *Phlebotomus sergenti*. An insect-proof room was used, the infected dog being kept in a cubicle with cement walls but an open roof.

600 specimens of *Phlebotomus* were put into the room on May 15th and one healthy dog showed leishmaniasis early in October, the other two showing infection in the next few days.

It is pointed out that it is uncertain which species of *Phlebotomus* was responsible.

U. F. RICHARDSON.

VOLKMAR, F. (1932). Ueber Leukozytozoonbefall der Puten. [**On a Case of Leucocytozoon Infection in Turkey Chicks**].—*Deuts. tierärztl. Wschr.* **40**. 134-135. [3 refs.]

The author discusses the epidemiology of leucocytozoon infection in turkey chicks. In two outbreaks reported by STEPHAN (1922) and by LAVERAN and LUCET (1905), the disease was observed on land with a similar geological formation (on the site of a former glacier).

The parasite, *Leucocytozoon smithi*, has an intermediate host believed to be a simuliid: the author considers that it is specific for turkeys and cites a number of clinical cases illustrating the symptomatology. The parasites are found in the blood cells, but they are not always numerous at the time of death; sublatent infection probably plays a part in the pathology of the condition.

Affected birds lose condition and become anaemic and losses are often great in birds up to four months old.

J. E.

SCOTT, J. W. (1930). **The Sarcosporidia. A Critical Review.**—*J. Parasitol.* **16**. 111-130. [53 refs.]

RILEY, W. A. (1931). **Sarcosporidiosis in Ducks.**—*Parasitology.* **23**. 282-285. 3 figs. on 1 plate. [12 refs.]

The first article reviews our present knowledge of the morphology, development and life history of the sarcosporidia. It contains a very complete list of references and should be consulted in the original by those interested.

The second article describes cases of sarcosporidiosis in ducks in the United States of America. The condition appears to be rare. Very heavy muscular infection was encountered, but no abnormality in flight was noticed. The specificity of sarcosporidia is discussed and it is pointed out that ducks can be experimentally infected with *S. tenella* from sheep.

U. F. RICHARDSON.

DISEASES CAUSED BY FILTRABLE VIRUSES.

GILDEMEISTER, E., & HELM, R. (1932). Ueber das Vorkommen des Virus der Maul- und Klauenseuche in Pockenlymphe. [**On the Occurrence of Foot and Mouth Disease Virus in Pox Lymph**].—*Zlb. Bakt. I.* (Orig.). **123**. 294-296. [4 refs.]

Following on the previous note of one of these authors [see this *Bulletin*. **1**. 282], this is a description of how samples of pox lymph from 14 German lymph factories were tested with negative results for the presence of foot and mouth disease virus by scarification inoculation into calves.

The authors considered that this test was desirable as the previous one was restricted to guinea pigs.

J. E.

- I. LEDINGHAM, J. C. G., MORGAN, W. T. J., & PETRIE, G. F. (1931). **The Potency and Distribution in the Serum Fractions of Antiviral Body obtained by Immunization of the Horse with Vaccinia Virus**.—*Brit. J. Exp. Path.* **12**. 357-372. 2 tables. [10 refs.]
- II. FAIRBROTHER, R. W. (1932). **The Action of Antivaccinial Serum on the Vaccinia Virus**.—*J. Path. Bact.* **35**. 35-40. 6 tables. [8 refs.]

I. With a view to securing an ample supply of antiviral serum, a horse was immunized with vaccine lymph receiving 282.5 c.c. in 30 graded doses by various routes (mainly intravenous). From time to time batches of plasma were fractionated with ammonium sulphate into euglobulin, pseudo-globulin and albumen components. The potency of the various samples was checked by adding graded amounts to fixed quantities of glycerinated lymph and inoculating the mixtures intradermally into the rabbit.

It was found that the immune body was associated with both the euglobulin and pseudo-globulin fractions but not with the albumen. The euglobulin contained the antibody in highest concentration per gramme of protein, but its absolute amount fell below that present in the pseudo-globulin.

The protective action of this serum was assayed in the rabbit with the object of ascertaining to what extent such serum, when inoculated intravenously, was capable of preventing the intradermal multiplication of the virus, and also of influencing the temperature reaction and development of specific organic lesions. A complete suppression of the cutaneous response occurred only when the serum was given not more than 24 hours before the virus. When serum and virus were administered simultaneously by the intravenous route, *post-mortem* examination revealed an entire absence of specific lesions except a few pocks on the pleura. The inoculation of serum when the febrile reaction to the virus had commenced did not appear to modify the general course of the disease apart from a marked fall in temperature on the following day.

II. This investigation was concerned with the neutralization of vaccinia with its immune serum. Neurovaccine with a skin titre of $1/10^8$ or $1/10^9$ was mixed with serum from rabbits which had recovered from the inoculation of vaccine culture virus, using graded quantities of serum and a fixed amount of virus. After contact at room temperature, the solutions were inoculated into young rabbits.

The intradermal experiments confirmed the findings of other workers, viz. that the virus may be inactivated without prolonged contact *in vitro* of serum-virus mixtures. In testing the effect of inoculating virus and serum at different

times, it was noted that when the serum was given after the virus, the greater the period which elapsed between the administration of the two components, the less was the chance of complete neutralization occurring. The addition of testicular extract had no apparent influence on the neutralization of virus by immune serum.

In contrast to the intradermal route, the virus was not readily modified by serum when injected intracerebrally. Contact of serum and virus for at least four hours was necessary in order to alter appreciably the infectivity of the latter.

R. E. GLOVER.

MAITLAND, H. B., LAING, A. W., & LYTH, R. (1932). **Observations on the Growth Requirements of Vaccinia Virus *in vitro*.**—*Brit. J. Exp. Path.* **13**. 90-96. 1 table. [9 refs.]

In continuation of their previous experiments on the growth of vaccinia *in vitro* [MAITLAND, H. B., & LAING, A. W. (1930). *Brit. J. Exp. Path.* **11**. 119.] the authors have studied certain modifications of their original medium. The observations of LI and RIVERS that the omission of serum from the medium does not impair the growth of the virus has been confirmed; moreover, the viability of the culture-virus during storage at low temperature is not altered. The substitution of a buffered phosphate solution for Tyrode's solution entirely prevented the multiplication of the virus. It is suggested that the explanation lies in the failure of the tissue cells to survive in this medium.

The distribution of the culture virus in tubes in which the tissues were covered by a layer of liquid approximately 15 mm. deep resulted in a progressive decrease in virus. It is probable that growth is dependent upon the respiratory activity of the tissues and that the virus fails to survive under these circumstances because adequate supplies of oxygen cannot be obtained.

With a view to supporting this contention the respiratory activity of various tissues in Tyrode-serum solution was studied according to the technique of WARBURG. It was shown that testis and kidney had a higher value than liver, while spleen respired very little, if at all. In a test-tube, when the depth of the medium was 15 mm., kidney did not respire after it had been incubated for 24 hours. It would appear, therefore, that there is a correlation between respiratory activity of different tissues and their suitability to promote growth of virus.

The culture medium (without serum) could be incubated at 37° C. up to two or three days before seeding with virus without adversely affecting its growth. Attempts were made without success to propagate the virus in the cell-free extracts described by EAGLES and McCLEAN.

R. E. GLOVER.

TEISSIER, P., RIVALIER, E., REILLY, J., & STEFANESCO, V. (1931). Essais de transformation variola-vaccinale à l'aide du virus variolique pur. [**An Attempt to convert Variola into Vaccinia**].—*C. R. Soc. Biol. Paris.* **108**. 1105-1107.

Two strains of variola were obtained, one from Northern Africa and the other from India. After passage in various ways through the monkey, the dog, the cat and the donkey, these strains were tested on 3 young bulls by simultaneous application to the scarified skin and testicular inoculation: a fourth animal, a heifer, was inoculated on the skin only. In each instance, the material failed to

induce either a cutaneous eruption or a testicular reaction. The animals were subsequently tested with vaccine virus; the 3 bulls were completely immune, while an abortive reaction was produced in the heifer.

These results are comparable to those observed in the rabbit in which the intratesticular introduction of the virus determined a non-transmissible "in-apparent" infection, discernible only by the subsequent development of an immunity to vaccinia. Similar results were also obtained in the pig.

In view of the failure of these experiments, the virus was passed through the donkey in an attempt to repeat the observations of CHAUMIER and BELIN on the conversion of variola into vaccinia by this device. The virus was applied to the skin of 13 animals and 6 of them were inoculated intratesticularly at the same time. In the subjects inoculated cutaneously, 5 developed a dry, papular eruption which was markedly different from the lesions induced in this animal by vaccinia, while of the 6 injected in the testicle, 4 showed a definite orchitis. Nevertheless, emulsions of these testes failed to evoke reactions in rabbits and cattle: monkeys, on the other hand were fully susceptible, presenting a typical eruption of a variolous type.

R. E. GLOVER.

DURAN-REYNALS, F., & STEWART, F. W. (1931). **The Action of Tumor Extracts on the Spread of Experimental Vaccinia of the Rabbit.**—*Amer. J. Cancer*. **15**. 2790-2797. 4 tables. [7 refs.]

Tumour extracts were prepared by grinding the tumours in a mortar with sand and an equal amount of Ringer's solution or distilled water. After centrifugalization of the pulp the supernatant fluid was drawn off and constituted the extract. 0.5 c.c. of the extract were mixed with 0.25 c.c. of a diluted vaccinia virus before inoculation intradermally into the skin of a rabbit. When the spreading of inert particles, such as Indian ink, was tested, 0.25 c.c. of extract was mixed with an equal volume of Indian ink diluted 1:2. As controls, the same amount of vaccine virus or Indian ink was injected together with distilled water or Ringer's solution into the same rabbit. The vaccinia lesions were measured when they had reached their maximum size, generally on the 4th to 6th day. The ink spread was measured on the day following injection.

The results of the experiments showed that watery extracts of 13 human sarcomatous tumours failed to increase the size of the vaccinia lesions and in 10 cases appeared to have a definitely inhibitory effect. With extracts of 28 epithelial tumours the effect was an inhibitory one in 10 cases and was judged to be an activating one in 11 cases. Tests made to study the diffusion of Indian ink injected into the skin of rabbits together with the same extracts indicated that, except in the case of melanomas, the increase in ink spread and the enhancement of the virus infection were more or less in parallel. This suggests that, as in the case of normal testicular extracts, the effect on the virus lesion is due to a modification of tissue permeability and not to any direct action on the virus.

I. A. GALLOWAY.

SCHNEIDER, J. E., & SALEM, L. (1931). **Rabies Virus as affected by certain Diluents.**—*J. Amer. Vet. Med. Ass.* **79**. 642-644. 1 table.

Concentrated emulsions of the brain and cord tissues of rabbits which had died of rabies on the seventh day after inoculation [presumably a "fixed" virus was being used] were made up in each of the five following fluids:—50 per cent.

glycerine in physiological saline, physiological saline with 1 per cent. chloroform, physiological saline with 1 per cent. of 90 per cent. phenol, physiological saline and distilled water. The emulsions were kept for 100 days at a temperature varying from 0° C. to 10° C., and shaken daily. The emulsions in physiological saline and distilled water proved to be fully infective after this time, but rabbits inoculated with the other three emulsions were still alive on the 20th day after inoculation.

I. A. GALLOWAY.

- I. SCHOENING, H. W. (1931). **Single Dose Rabies Prophylactic Vaccination.**—*North Amer. Vet.* **12**. No. 6. 45-46.
- II. —. (1932). **B. A. I. reports favourably on Single-Dose Rabies Prophylactic Vaccine for Dogs.**—*Ibid.* **13**. No. 1. 8.
- III. SCHOENING, H. W. (1931). **Immunization of Dogs against Rabies by the one injection Method.**—*Amer. J. Publ. Health.* **21**. 637-640. [7 refs.]

I. Schoening considers that the results of the experimental work done warrant the use of prophylactic rabies vaccines, where rabies is a menace, but that the shortcomings of vaccination should be recognized. There is no 100 per cent. efficiency and the possibilities of the development of post-vaccination paralysis, though remote, should be recognized. Reliable field information on the use of the vaccine is lacking. Vaccination, no matter how effective, cannot by itself control outbreaks of rabies. The stray dog will always remain a factor which must be considered.

II. In an experiment carried out by the Bureau of Animal Industry, U.S.A., five dogs were given a single dose of vaccine and four were found resistant fourteen months afterwards to a dose of rabies street virus sufficiently active to produce rabies in four out of five control dogs.

III. The question of the one dose vaccine is discussed under three headings :—

- (a) Does it immunize ?
- (b) Is it safe ?
- (c) How long does immunity last ?

(a) The vaccines used were of two commercial types, one phenol-treated and the other chloroform treated, both of which are either killed or are so weakly virulent that they cannot produce the disease by subdural injection into rabbits. In an experiment, of 12 dogs treated with phenol vaccine and later exposed to street virus by intramuscular inoculation, five died of rabies, and in eleven controls nine died of rabies, showing a favourable difference for the vaccinated dogs.

Experience shows that failures are to be expected. The question of the plurality of types of rabies virus is discussed. The writer has one strain against which apparently little immunity in dogs can be produced. Using the chloroform-treated vaccine, nine dogs all survived exposure to street virus injected intramuscularly, whereas in the controls eleven out of thirteen were infected with rabies.

(b) The phenol-killed vaccine if properly prepared is incapable of producing rabies, but the question of post-vaccinal paralysis must be taken into account. The chloroform-treated vaccine, like the phenol treated, if prepared properly cannot produce rabies. No cases of paralysis have been seen in 180 dogs treated.

(c) The details concerning the persistence of immunity after vaccination are meagre. One case is reported which resisted infection one year after vaccination. The writer does not consider that the immunity should be considered to last more than one year.

The data concerning chloroform-treated vaccine are not available beyond four months.

NORMAN DOBSON.

BEACH, J. R. (1932). **Studies of the Etiology of Laryngotracheitis (Infectious Bronchitis) of Chickens.**—*J. Amer. Vet. Med. Ass.* **80**, 496-504. 1 table. [11 refs.]

This paper was presented at the Annual Meeting of the American Veterinary Medical Association, 1931. It contains a brief survey of the investigations carried out by the author on the etiology of laryngotracheitis, a review of which work has already appeared [see this *Bulletin*. **2**, 290].

T. M. DOYLE.

GILBERT, S. J., & SIMMINS, G. B. (1931). **Observations on a Disease of Fowls due to a Filterable Virus and Associated with Leucocytic Inclusions.**—*J. Comp. Path. & Therap.* **44**, 157-169. 4 tables, 3 charts. [2 refs.]

The authors describe a disease of fowls in Palestine characterized by a varying mortality and the presence of inclusion bodies within the cytoplasm of the polymorphonuclear leucocytes. They believe the disease to be identical with that previously described by ADLER in Palestine and by MACFIE in Nigeria.

There is nothing characteristic about the symptoms or the naked eye lesions found on *post-mortem* examination. Infected spleen and liver suspensions, when passed through Berkefeld, Chamberland L3 and Seitz filters, set up the typical disease with the appearance of inclusion bodies within 80 to 90 per cent. of polymorphonuclear leucocytes, with the exception of two or three instances when the large mononuclears were affected.

The inclusions were practically confined to the polymorphs; the cytoplasm was always affected and occasionally a few inclusions were present in the nucleus.

The inclusion bodies varied considerably in shape and four principal types were observed :—

1. Solid spherical masses.
2. Regular rings or incomplete rings.
3. Irregularly shaped masses.
4. Minute granules which were sometimes situated in vacuoles.

In artificially infected birds the incubation period was short, a rise of temperature (110° F. or higher) occurring within 24 hours of inoculation and death occurring in from two to five days. The mortality following artificial infection was about 25 per cent. In non-fatal cases there was a long period, varying from six to eight weeks, of intermittent fever.

T. M. DOYLE.

ANDREWES, C. H. (1932). **Some Properties of Immune Sera active against Fowl-Tumour Viruses.**—*J. Path. Bact.* **35**, 243-249. 2 text figs., 3 tables. [10 refs.]

This paper embodies the results of further experiments on the nature of antibodies against fowl tumours. The sera obtained from birds affected with two strains of a slow-growing fibrosarcoma were tested against sand and paper pulp filtrates of the Rous sarcoma. Difficulties were experienced in interpreting

the results, on account of variable responses in different birds, but evidence of neutralization was obtained.

The experiments indicated that antibodies develop rather slowly since sera obtained less than five months after inoculation were never very active: after five months they were usually quite potent. The time and temperature of contact of serum with virus appeared to influence the results since inoculation of the mixtures at 37° C. for 1, 2 or 4 hours respectively definitely aided neutralization, whereas contact for 1 hour at 20° C. had the reverse effect. Attempts were made to reactivate serum-virus mixtures by dilution or by precipitation of euglobulin by saturation with carbon dioxide: the results were not conclusive but, provided that the serum and virus had not been long in contact, recovery of the virus was possible.

R. E. GLOVER.

- I. FINDLAY, G. M., & DAUBNEY, R. (1931). **The Virus of Rift Valley Fever or Enzootic Hepatitis.**—*Lancet*. **221**. 1350-1351. [1 ref.]
- II. FINDLAY, G. M. (1932). **Rift Valley Fever or Enzootic Hepatitis.**—*Trans. Roy. Soc. Trop. Med. Hyg., London*. **25**. 229-265. 6 plates, 9 text figs., 2 tables. [10 refs.]
- III. BROOM, J. C., & FINDLAY, G. M. (1932). **Complement Fixation in Rift Valley Fever.**—*Lancet*. **222**. 609-611. 5 tables. [4 refs.]
- IV. DAUBNEY, R., & HUDSON, J. R. (1932). **Rift Valley Fever.**—*Ibid*. 611-612. [6 refs.]

I. The authors report the results of studies in England on a strain of Rift Valley fever virus obtained from Kenya. The virus was transmitted to the sheep by means of infected blood. During the *post-mortem* examinations of these animals, three workers contracted a disease presenting a febrile reaction comparable to that observed in man in Kenya; all the patients recovered.

The virus was transmitted to several species of animals. In monkeys, inoculation was followed from 2 to 5 days later by a fever of 2 to 3 days duration characterized by a leucopenia. The disease was not fatal, but focal necrotic lesions were observed in the liver. The virus was highly pathogenic to mice and rats, the animals dying in from 36 hours up to 4 days with an acute hepatic necrosis associated with a polynuclear leucocytic invasion and haemorrhages in internal organs. The fatal dose for the mouse was 0.1 c.c. of a 1 in 10,000,000 dilution of infective blood inoculated intraperitoneally. Rabbits, guinea pigs and several species of birds were insusceptible, while cats were infected with difficulty.

II. Findlay gives in greater detail the results of the preceding investigation. The virus was found in the blood, liver and spleen of infected rats and mice, and was readily filtrable through Berkefeld N, V and W candles. The virus was transmitted to the goat after 5 and 30 passages respectively through mice, and to a ewe and lamb after 56 passages. In the monkey, infection was set up by subcutaneous, intraperitoneal or intracerebral inoculation. Evidence was obtained that serial passage in this species might debase the virulence of the infective agent.

A detailed description, which should be consulted in the original, is given of the *post-mortem* and histological changes. The occurrence of definite acidophilic bodies, not unlike "intranuclear bodies" associated with virus III and herpes infection, is reported. These bodies have been found in the liver cells of infected lambs, goats and some rats, but their exact significance is unknown. Findlay thinks they may represent collections of acidophilic nucleoli or plasmosomes.

In the discussion, HINDLE stressed the resemblance of this disease to yellow fever and to dengue, but observed that, whereas in yellow fever the necrosis affected the cells of the mid-zone, in Rift Valley fever the necrosis did not appear to be restricted in this manner. EDWARDS stated that the clinical and pathological appearances of Rift Valley fever simulate "three day sickness" as seen in Indian cattle. He suggested that the disease might be caused by a three-day sickness virus that had become adapted to a wide range of animal species. MONTGOMERY drew attention to the occurrence of a disease of this nature in East Africa in 1912 which resulted in a high mortality amongst newly-born lambs.

III. In this communication, the presence of complement-fixing antibodies is demonstrated. The antigen was prepared by centrifuging a saline extract of fresh infective mouse or rat liver. It was also possible to utilize liver dried over phosphorus pentoxide, but the results were less clear-cut. Experiments with several human sera, of which three were from recovered human cases, showed that fixation was specific for Rift Valley fever and did not occur with normal serum, nor with serum from recovered cases of dengue and yellow fever. Similar results were obtained with sera from monkeys, sheep, mice and rats, but in the case of rodents the antibodies disappeared with rapidity and were often no longer detectable two months from the date of infection. No fixation was obtained with sera of those animals which have been found to be resistant to the virus.

Attempts to demonstrate flocculation or agglutination of the virus were unsuccessful, nor was it possible to obtain a skin reaction in animals immune to the disease.

IV. Daubney and Hudson observe that, in the original outbreak in Kenya, there was a considerable mortality amongst wild rats on the affected farms. In order to test the susceptibility of this species to the virus, a series of rats from fever-free areas was inoculated. Out of 57 *Arvicanthus abyssinicus nairobae* inoculated with the virus from sheep or mice, 19 died within 20 days and the specific nature of the infection was confirmed in several instances by sub-inoculations into suitable animals. Other species of wild rodents seemed to be less susceptible to infection.

It is noted that the virus was able to survive for a period of 7 days in the engorged nymphae of *Rhipicephalus appendiculatus* which had been fed on infected sheep: 24 hours later, when the nymphae had moulted, they failed to transmit the virus on inoculation into sheep.

With reference to the statement of MONTGOMERY [*vide supra*], Daubney and Hudson consider that the lesions he describes do not resemble those of Rift Valley fever. They are also of the opinion that, while "three-day sickness" of cattle is probably a member of the same group of virus diseases, it should be regarded as distinct from enzootic hepatitis.

R. E. GLOVER.

- I. DAVIS, N. C., & SHANNON, R. C. (1931). Studies on Yellow Fever in South America. Attempts to transmit the Virus with certain Aedine and Sabethine Mosquitoes and with Triatomas (Hemiptera).—*Amer. J. Trop. Med.* 11. 21-29. 2 tables. [6 refs.]
- II. DAVIS, N. C. (1931). The Transmission of Yellow Fever. On the Possibility of Immunity in *Stegomyia* Mosquitoes.—*Ibid.* 31-42. 3 tables. [3 refs.]

- III. DAVIS, N. C. (1931). **The Transmission of Yellow Fever. Further Experiments with Monkeys of the New World.**—*Ibid.* 113-125. 1 table. [7 refs.]
- IV. FROBISHER, M., Jr. (1931). **Further Observations on the Filtrability of Yellow Fever Virus.**—*Ibid.* 127-137. 1 table. [12 refs.]

I. The authors have shown *Aedes fluviatilis* to be a fairly efficient carrier of yellow fever virus under laboratory conditions. In one case the feeding of three infected mosquitoes on a healthy monkey set up the disease. *Aedes taeniorhynchus* did not prove quite so adaptable; the sabethine mosquitoes caused no infections and indefinite results were obtained with the triatomas. In considering infectivity under natural conditions, the habitat and habit of the insects must be examined and in this respect, whilst *Aë. fluviatilis* would be dangerous in only a few districts, *Aë. taeniorhynchus* should be reckoned a possible vector.

II. Stegomyia mosquitoes do not acquire immunity to yellow fever from the ingestion of immune blood; the immune bodies appear to be destroyed in the digestive tract. A number of these mosquitoes captured in houses in Bahia did not prove infectious when injected into rhesus monkeys.

III. In continuation of previous work, the author has investigated the infectivity of yellow fever virus for a number of monkey species. He was able to infect members of the genera enumerated below; in some of them, however, the convalescent serum was not protective; the genera concerned were:—*Alouatta*, *Gallicebus* (probably), *Pithecia*, *Gebus*, *Ateles*, *Aotus*. *Cacajao rubicundus* resisted infection.

IV. This author has confirmed the findings of BAUER and MAHAFFEY that virus obtained from infected mosquitoes is capable of passing Berkefeld V filters without the assistance of serum, provided that enough active virus is present at the time of filtration. Usually, if the virus is not exposed to the suspending fluid for more than ten minutes, filtration can be effected. Owing to the presence of serum in blood virus, it is more stable, and it is suggested that the serum proteins exert a protective action by coating the virus molecules. The hydrogen ion concentration has little effect on filtration.

NORMAN HOLE.

- I. FLEXNER, S. (1931). **Poliomyelitis (Infantile Paralysis).**—*Science*. **74**. 251-254.
- II. JUNGEBLUT, C. W., & KOPELOFF, N. (1931). **Influence of Artificial Fever on the Course of Experimental Poliomyelitis.**—*J. Infect. Dis.* **49**. 348-354. 2 charts, 1 table. [2 refs.]

I. This is a popular article giving a fairly complete résumé of the present state of knowledge of poliomyelitis. The disease is commonly called infantile paralysis but, as pointed out by the author, many cases never show paralysis at all and, indeed, it is probable that the cases of the non-paralytic type greatly exceed in number those in which actual paralysis occurs. No references are given.

II. The authors, bearing in mind the beneficial effects recorded in the treatment of syphilitic *dementia paralytica* by the production of a febrile reaction with benign tertian malaria, decided to test what they term "fever therapy" in monkeys infected with the virus of poliomyelitis. Their results indicate that the induction of non-infectious fever maintained only over comparatively short periods of time during the period of incubation, after infection with the virus by

the intracerebral route, did not alter the course of the disease. This febrile reaction was produced by the inoculation of protein parenterally or by radiotherapy using an ultra-high frequency oscillator. The same negative results were obtained in the case of infectious fever produced during the incubation period by inoculation with *Trypanosoma equiperdum*.

I. A. GALLOWAY.

RIVERS, T. M., & BERRY, G. M. (1931). **Psittacosis : Pneumonia Experimentally produced in Monkeys.**—*J. Amer. Med. Ass.* **96**. 2061-2062.

BEDSON, S. P. (1932). **The Nature of the Elementary Bodies in Psittacosis.**—*Brit. J. Exp. Path.* **13**. 65-72. 4 tables. 4 figs. on 1 plate. [9 refs.]

CHAGAS, C. (1931). L'épidémie de psittacose en 1929-1930 est-elle venue du Brésil? [**Did the 1929-1930 Outbreak of Psittacosis originate in Brazil?**]*—Bull. Off. internat. d'Hyg. publ.* **23**. 239-240.

TURKHUDD, D. A. (1931). **Similarity between Psittacosis and an Epizootic observed among Chickens at Kodaikanal.**—*Ind. Vet. J.* **7**. 237-238.

In the work of Rivers and Berry, young *Macacus rhesus* monkeys were inoculated intranasally and intratracheally with liver and spleen emulsions of mice affected with psittacosis virus. Pulmonary lesions were produced which were characterized by fibrin deposition, infiltration of the alveolar walls with large mononuclear cells and desquamation of alveolar epithelium. A definite leucopenia was noted at an early stage of the disease. Rickettsia-like bodies were not found in infected monkey lungs, although they were present in mice inoculated with the same material.

Bedson has examined a large amount of material from infected mice, guinea pigs and parrots, and has demonstrated round or slightly oval structures closely resembling Paschen bodies. In this communication he has sought to correlate these "elementary bodies" with the virus.

The infective agent can be freed from extraneous material by fractional centrifugation. An emulsion of virulent mouse spleen is clarified by centrifuging for 10 minutes at 2,000 r.p.m. The supernatant fluid is then centrifuged for 2 hours at 5,000 r.p.m. and the deposit, suspended in saline solution, is again submitted to a fractional centrifugation. It can be shown by guinea pig inoculation that the final deposit is very rich in the virus and is entirely composed of minute bodies similar to those seen in fresh virulent material. The washed bodies are agglutinated by an anti-psittacosis serum and also fix complement in its presence.

Chagas asserts that no authentic cases of human psittacosis have been observed in Brazil: moreover, epizootic outbreaks amongst wild parrots have not been reported from any part of the country. He suggests that the disease is strictly confined to birds which are kept in captivity and is probably contracted during the long sea journeys to which they are subjected.

In this abstract of a paper presented to the Indian Science Congress, 1931, Turkhudd describes an epizootic amongst chickens in which the deaths were not attributable to fowl cholera or to other common diseases of chickens. The outbreak presented many similarities to "Ranikhet disease" in which COOPER has demonstrated a filtrable virus, identical with that of "Newcastle disease." The author suggests that, from the symptoms, pathological appearances and bacteriological findings, these diseases are probably identical with psittacosis. [On account of the meagre data which are given in this abstract, the reasons for this assumption are not clear.]

R. E. GLOVER.

DISEASES CAUSED BY METAZOAN PARASITES.

- (1930). **The Proceedings of the Helminthological Society of Washington, 127th-130th Meetings.**—*J. Parasitol.* 17. 52-58.

Among the several notes presented at these four meetings of the Society the following may be mentioned as of particular interest :—

R. WETZEL reported some observations on the development of the eggs and larvae of *Strongylus equinus* in relation to temperature, which had led him to conclude that in a normal year at Hanover, Germany, conditions are favourable for the development of the infective larvae from about the middle of March to the middle of November.

W. H. WRIGHT gave an account of the finding of *Hepaticola* sp. in three out of 216 dogs [presumably in Washington]. Eggs were secured from the livers and successfully cultured in tap water and were found to reach the infective stage in about nine weeks. Some of these were fed to a five months' old puppy which at autopsy eight weeks later was found to have 44 separate foci of infestation in the liver. Attempts to infect rats were, however, not successful and the author feels that he cannot determine the species with any certainty.

G. DIKMANS reported the presence of a specimen of *Trichostrongylus delicatus* among a collection of nematodes from Louisiana.

E. B. CRAM reported three new hosts for *Strongyloides avium*, the junco (*Junco hyemalis hyemalis*), the coot (*Fulica americana*) and the ruffed grouse (*Bonasa umbellus*). Three birds were also reported as hosts for *Syngamus trachea*, the Gambel sparrow, the water-thrush, and the junco.

An account was also given of the finding of aberrant third stage larvae of *Physcephalus sexalatus* encysted in considerable numbers in the intestinal wall and in the mesenteries of four species of birds, the loggerhead shrike, the screech owl, the red tailed hawk and the wood thrush.

M. F. JONES reported the ground beetle *Galathus opaculus* as an additional intermediate host for the poultry cestode *Raillietina cesticillus*.

E. W. PRICE reported the finding of cysticeroids, apparently of the species *Hymenolepis nana*, in the mesenteric lymph glands of one third of the white mice examined in the Zoological Division of the Bureau of Animal Industry.

E. W. NIGHBERT presented a note on the bad effects of a heavy infestation with immature oesophagostomes in a herd of 73 pigs; the large intestine contained numerous nodules, some of which were ulcerated.

D. F. SINITSIN contributed a few observations on the life-history of the salmon-poisoning fluke of dogs *Nanophyetus salmincola*. A short description of the cercaria is given and an account of the way in which it infects the salmon. Feeding experiments showed that the mature worms would develop in guinea pigs, but although present in large numbers the "salmon-poisoning" as seen in dogs did not develop. The worms are soon eliminated from this experimental host, after which a strong immunity develops. Rats were found to be insusceptible to infection.

E. L. TAYLOR.

- BARLOW, C. H. (1931). **A New Method for Examining Urine for Helminth Eggs.**—*Amer. J. Hyg.* 14. 212-217. 2 figs.

A measured amount of urine is centrifugalized at 800 revolutions per minute for one minute, the supernatant fluid is then drawn off with a pipette and one drop of an aqueous solution of methylene blue is added to the sediment. A

rectangular area 10 × 15 mm. is enclosed with a grease pencil on a 38 × 75 mm. slide to which the stained sediment is now transferred, evenly spread with a dissecting needle and allowed to dry. In this form the material may be stored for any length of time and is very convenient for despatching by post. Another advantage is that the eggs of *Schistosoma mansoni* tend to roll on to their sides during the process of drying and show the spine in profile.

Slides are moistened with water before each examination and may be redried and remoistened as many times as may be required.

E. L. TAYLOR.

- I. DANKS, W. B. C. (1931). **Some Parasites of Dogs in Kenya.**—*Ann. Rep., Dept. Agric., Kenya, 1930.* pp. 133-136. Nairobi: Govt. Printer.
- II. LAUE, W. (1931). 49 cm langer Parasit in einem 26 cm langen Hecht. [A 49 cm. long Parasite in a 26 cm. long Pike].—*Tierärztl. Rdsch.* **37.** 867-868.

I. In the ordinary course of his routine duties during the previous year the author has encountered three interesting parasites. *Hepatozoon canis* was found associated with symptoms like those of distemper. Experimental transmission was not successful when ticks were used, but in the three trials which were made infection was brought about through the transference of fleas from infected to uninfected dogs.

Spiroptera sanguinolenta [*Spirocerca sanguinolenta*] was found in a dog which had vomited repeatedly and shown periodic fits of excitement. Reference is made to GRASSI's publication on the life history of this worm in which the cockroach is said to be the intermediate host, [the author apparently being unaware of more recent work by SEURAT and by FAUST showing that various coprophagous beetles act as intermediate hosts, and describing later stages of the life cycle].

Microfilariae 210 μ long were also found in the blood of two dogs, presumably belonging to the species *Dirofilaria immitis*.

II. This note records the finding of a large specimen of the intermediate stage of *Ligula intestinalis* (a cestode parasite of fish-eating birds) in the body cavity of a small pike. A few remarks are added by R. HOCK on what is known of its life history and of the several fish hosts in which it occurs. As infected fish is unsightly it is considered that it should for that reason be condemned as unfit for human consumption.

E. L. TAYLOR.

- CLARENBURG, A. (1931). Untersuchungen über die Lebensfähigkeit von *Cysticercus inermis*. [Investigations on the Vitality of *Cysticercus inermis*].—*Zeitschr. Infektkr.* **40.** 172-190. 3 tables. [22 refs.]

The results obtained by various investigators on the ability of the bovine cysticercus to withstand cooling temperatures are very contradictory and leave ample scope for further inquiry. The material which the author used in his several trials was obtained through the experimental infestation of a calf with segments of the mature worm. Various preliminary trials of the evagination test for the vitality of the cysts in meat showed that sodium taurocholate and sodium glycocholate are the active components of the bile and that sodium palmitate and sodium stearate are inactive. Pepsin in solutions varying in strength from 0.5 to 10 per cent. was also found to have no action, but activated extract of pancreas gave good

results and brought about evagination as quickly as did bile. Trypsin and pancreatin in 1 to 3 per cent. solution also gave good results ; but the quickest results were obtained with 50 per cent. bile solution at 40° C.

Observations made on cysts from meat which had been kept at cooling temperature for various times showed a marked difference between the vitality of those obtained from various parts of the carcass, and it is thought that this is the probable explanation of the diversity of the results which have been reported.

Attempts to infect two monkeys (*Macacus rhesus*) with fresh cysts and with cysts which have been stored in cool rooms gave negative results, agreeing with results which have previously been obtained.

A few observations on the effect of freezing show that the exposure of infected meat to -10° C. for 10 days as required in Holland, is a longer period than is necessary.

The cysts in a piece of meat 6 cm. thick were found to be dead after five days in brine. Cysts in a piece of meat 8 cm. thick were found to be still alive after 5 and 10 minutes boiling, but all were dead after 15 or more minutes. Roentgen ray treatment of meat 2 cm. in thickness was found to have no effect on the vitality of the cysts.

E. L. TAYLOR.

- I. SCHMEY, M., & BUGGE, G. (1931). Die Entwicklungsfähigkeit der Rinderfinnen. [**The Capacity for Development of the Bovine Cysticercus**].—*Berl. tierärztl. Wschr.* **47**, 501-508. 10 figs.
- II. SCHMEY, M., & BUGGE, G. (1931). Ueber Selbstinfektionsversuche mit Rinderfinnen. [**On Self-Infection Experiments with Bovine Cysticerci**].—*Tierärztl. Rdsch.* **37**, 719-722.

I. Following their previous work [see this *Bulletin*. **2**, 17.] in which it was shown that the regulation time of 21 days' cooling was not sufficient to kill *Cysticercus bovis* in beef, the authors had intended to carry out similar experiments with other tapeworm cysts, the subsequent ability of which to develop to maturity could be tested by feeding to animals. The criticism which has been levelled at their work has, however, forced the authors to proceed directly to the verification of their conclusions by feeding experiments on man to test the capacity for further development of cysts from cooled beef. Two series of experiments were carried out in which 6 volunteers took, in all, 105 cysts with the result that three became infected, and 6 mature worms were ultimately recovered after anthelmintic treatment.

At the present time the law in Germany makes provision for the treatment of beef which is slightly infected with *Cysticercus bovis* ; it must be cooled, frozen, cooked or pickled but the internal organs and fat are allowed to pass without any specified treatment. These points are discussed in the light of the authors' further researches. They have found that the fat is a frequent site of infestation and, although the cysts could not be discovered in the walls of the stomach and intestine, the authors think that they probably also occur in the fat in that situation. These parts should therefore not be excluded from treatment for destruction of the cysts and for this purpose the authors make the following recommendations :—

Twenty-one days cooling is not enough, as the vitality of the cysts lasts for 39 to 41 days and they are capable of further development for at least 28 days ; the cooling time should therefore be lengthened accordingly.

Four days freezing at -8° C. to -10° C. kills all the cysts and is thought to be the most practical method of dealing with the meat.

Cooking kills all the cysts, but greatly reduces the marketable value of the meat.

Pickling, if properly carried out, is also an effective method and, where brine is injected, 7 days subsequent immersion of the meat is sufficient instead of 14 days as at present required.

It is suggested that the difference between the authors' results on the efficiency of cooling and those obtained by VON OSTERTAG, 35 years previously, may possibly find an explanation in the improvement of the cooling technique which at the present day postpones the appearance of those changes in the meat which lead to the death of the cysticerci.

II. In the second paper, which is merely a reply to criticism, the authors discuss the ethical aspect of infection experiments on man with *Cysticercus bovis*. Their experiences clearly show that these trials are not always without danger and that they were wise in wishing to reserve this part of the work until a later date, when more information would have been acquired from observations on the feeding of allied tapeworms to dogs. In support of their attitude to this question they conclude by giving a list of rules which have recently been laid down in Germany for the regulation of the trials of new remedies on the human subject. Among other restrictions these specifically state that no experiments shall be carried out on man until as much information as possible has been derived from trials on animals.

E. L. TAYLOR.

- I. KELLER, A. E. (1931). **Eight Cases of Human Infestation with the Rat Tapeworm** (*Hymenolepis diminuta*).—*J. Parasitol.* **18**, 108-110. 1 table. [6 refs.]
- II. RANDRIAMBELONA, M. (1931). Notes sur l'échinococcose à Madagascar. [Notes on Echinococcosis in Madagascar].—*Bull. Soc. Path. exot.* **24**, 972-973.
- III. QUEEN, F. B. (1931). **The Prevalence of Human Infection with *Trichinella spiralis***. [Paper presented at 7th Ann. Meeting, Amer. Soc. Parasitologists, New Orleans, Dec. 29th, 30th and 31st].—*J. Parasitol.* **18**, 128.

I. On account of the comparative rarity of this cestode in the human subject it was considered of interest to record these cases.

During the past 2 years 31,000 examinations for intestinal parasitism have been made in Tennessee, mostly among school children aged 5 to 19 years and it was among these that the 8 infestations with *Hymenolepis diminuta* were found.

II. This short note is published to call attention to the presence of echinococcus in the ox in Madagascar. Its occurrence is more common than is suggested by the comparative infrequency with which it is mentioned by meat inspectors. The author observes that it was the cause of the seizure of 1,044 organs from 38,696 cattle (2·7 per cent.) and that on certain days as many as 5 per cent. of the cattle slaughtered at Tananarive were found to be infected.

III. Examinations were made for trichinae by artificial digestion, sectioning, and crush preparations of the diaphragms from 344 necropsies in Rochester, N.Y. and 58 from Boston, Mass. Fifty-nine (17·5 per cent.) were found to be positive in the first group and 16 (27·6 per cent.) in the second. Living larvae were recovered from 75 per cent. of the positive cases. There were no histories of trichinosis and it appears probable that many ill-defined cases are being overlooked.

E. L. TAYLOR.

- I. ARCHIBALD, R. G., & MARSHALL, A. (1931). **A Technique for the Study of Cercariae.**—*Trans. Roy. Soc. Trop. Med. Hyg. London.* **24.** 629-630. [2 refs.]
- II. DUNN, L. H. (1931). **A Simple Method for Collecting Adult Filarial Parasites from Muscle Tissues of Monkeys.**—*J. Parasitol.* **18.** 111-112. [2 refs.]

I. The difficulty encountered in the study of the morphology of larval trematodes is well known and, although living material is always greatly to be preferred, the delineation of detail is none too easy when mounted in water. The authors have found that the examination of living cercariae is greatly facilitated by mounting them in serum: this is said to have "a clearing effect" on the structures; the still active flame cells can then be readily located and the course of the fine excretory tubercles traced with ease.

Excellent stained preparations have been obtained by fixing the cercariae in hot lactophenol to which, when cool, is added a little dilute haematoxylin or borax carmine. This is allowed to act on the cercariae for from 12 to 24 hours and they are then ready for examination. Permanent mounts may be made in a medium consisting of 3 parts gum tragacanth, 1 part gum acacia and 100 parts water, to which is added an equal quantity of lactophenol.

II. The author had experienced great difficulty in securing uninjured specimens of the filarial worms which commonly occur in the muscles of the back and legs of certain monkeys in Panama. Dissection was found to be tedious and rarely successful, but a method which gave good results and was finally adopted was that of placing the eviscerated carcass, with skin and feet removed, in a large dish of normal saline which was maintained at 99° F. Under these conditions it was found that the filariae endeavour to leave the muscles and in the course of 2 to 4 hours some may be recovered from the fluid, and others, which have almost extricated themselves, may easily be removed with forceps.

E. L. TAYLOR.

- BRUMPT, E. (1931). **Prurit et dermatites produits chez les nageurs par des cercaires de mollusques d'eau douce. [Pruritis and Dermatitis in Bathers caused by the Cercariae of Fresh-Water Molluscs].**—*C. R. Acad. Sci. Paris.* **193.** 253-255.

After a résumé of the recorded cases of cercarial rashes, Brumpt details an experiment on himself with *Cercaria ocellata* from *Limnaea stagnalis*. Out of 150 cercariae placed on his skin, 149 penetrated within ten minutes with a sensation of pricking; spots were produced which persisted for over five days.

T. W. M. CAMERON.

- I. BRUMPT, E. (1931). *Cercaria ocellata*, déterminant la dermatite des nageurs, provient d'une bilharzie des canards. [*Cercaria ocellata*, originating from a Bilharzia of Ducks, a cause of Dermatitis in Bathers].—*C. R. Acad. Sci.* **193.** 612-614. 1 fig.
- II. STAFFORD, E. W. (1931). **Platyhelminia in Aquatic Insects and Crustacea.** [Paper presented at 7th Ann. Meeting, Amer. Soc. Parasitologists, New Orleans, Dec. 29th, 30th and 31st].—*J. Parasitol.* **18.** 131.

I. The author reports some further experiments with *Cercaria ocellata* in the course of which he has been successful in infecting ducks and has recovered the extremely fine adult worms from the superficial vessels of the mucosa and in some of the vessels of the mesentery. Up to the present time he has

not been able to secure a complete specimen, but a study of the fragments has enabled him to identify the species with *Trichobilharzia kossarewi* Skrjabin, 1920, which by the application of the law of priority, should now be called *Trichobilharzia ocellata* (La Vallette) 1854.

II. Stafford reports the finding of several immature trematodes in aquatic insects and crustacea, among which is mentioned *Prosthogonimus* sp. in *Pachydiplax longipennis*, *Mesothemis simplicicollis* and *Perithemis domitia*, the adults being obtained experimentally by feeding to chickens; *Eumegacetes medioximus* in *Gomphus externus* and *G. plagiatus*, the adults also being obtained experimentally by feeding to chickens.

E. L. TAYLOR.

I. BAYLIS, H. A. (1931). On the Structure and Relationships of the Nematode *Capillaria* [*Hepaticola*] *hepatica* (Bancroft).—*Parasitology*. **23**. 533-543. 3 figs., 1 table. [32 refs.]

II. MAPLESTONE, P. A. (1931). *Oesophagostomum conicum*.—*Ann. Trop. Med. Parasitol.* **25**. 551. [1 ref.]

I. Perfect specimens of this species are difficult to obtain and, on this account, the available data on its morphology is very inadequate; BANCROFT'S (1894) original description of the male is apparently the only one in existence. The author was able to obtain some fairly complete specimens from the livers of wood-mice, *Apodemus sylvaticus*, which have enabled him to observe that bacillary bands are present and that the male carries a spicule, the absence of both of which were supposed to be characteristic of the genus *Hepaticola*.

It is the author's experience that it is not unusual to meet with forms of *Capillaria* in which the spicule is very difficult or almost impossible to see and in his opinion this cannot be regarded as a suitable generic character. It must evidently be relinquished for the differentiation of the genus *Hepaticola* and it is probably just as valueless for the differentiation of the genus *Eucoleus*, which mainly depends upon that point; he concludes that these two genera should now be suppressed as synonyms of *Capillaria*.

It is also held, in agreement with the majority of recent authors that the genera *Thominx*, *Galodium* and *Liniscus*, proposed by DUJARDIN (1845) as distinct from *Trichosomum* [i.e. *Capillaria*], should be suppressed. *Eucoleus aerophilus*, a parasite of the lungs of the cat, dog and fox should therefore be called *Capillaria aerophila* (Creplin, 1839) and *Hepaticola hepatica*, from the liver of the dog and cat, etc., becomes *Capillaria hepatica* (Bancroft, 1894).

II. Maplestone previously described a new species of *Oesophagostomum* from the pig and named it *O. conicum*. SCHWARTZ, however, pointed out in a private letter to the author that this combination is preoccupied and in the present paper, Maplestone therefore proposes the new name *O. conoides*. [A short time before this note appeared SCHWARTZ published a paper (*Vet. Med.* **26**. 411.) in which he confirmed Maplestone's new species, but pointed out the oversight in the name and suggested the new name *O. maplestoni*. As SCHWARTZ's publication has priority this is the correct name for the species.]

E. L. TAYLOR.

FINKELDEY, W. (1931). Pathologisch-anatomische Befunde bei der Oesophagostomiasis der Javaneraffen. [Pathological Changes Associated with Oesophagostomiasis of the Java Ape].—*Zeitschr. Infektr.* **40**. 146-164. 9 figs. [19 refs.]

This paper gives an account of the author's findings in *post-mortem* examinations of specimens of *Silenus fascicularis* which were presumed to have died as a

result of infestation with *Oesophagostomum brumpti*. [As only 30 or more mature worms were found in any one instance and only up to 100 larvae and as many eggs in a normal motion, the infestation cannot with any certainty be regarded as the cause of death.] During the examination of his material, one larval worm was found in the lung, one in the deep layers of the mucous membrane of the stomach and several (in the rhabditiform stage) in the intestinal contents; groups of eggs, some containing well developed embryos were also found imbedded in the mucous membrane of the stomach. He tentatively concludes that, in the normal course of the life history of this parasite, the eggs hatch in the intestine where the larvae develop to a certain stage, but cannot reach the infective stage until they have left this host and possibly not until they have passed through some intermediate host for which purpose the flea may be suspected. He regards a passage through the lung as obligatory; he thinks that some of the worms may reach maturity in the wall of the stomach and even suggests that some larvae from the eggs of those worms may reach the infective stage without leaving the body of the host. [Some of these observations are at variance with what is known of the life history of oesophagostomes and allied worms, and the unorthodox views on the evolution of *O. brumpti* here expressed should be accepted with reserve.]

E. L. TAYLOR.

McCoy, O. R. (1931). **The Egg Production of Two Physiological Strains of the Dog Hookworm, *Ancylostoma caninum*.**—*Amer. J. Hyg.* **14**. 194-202. 1 table, 1 graph. [11 refs.]

The two different physiological strains of *A. caninum* described by SCOTT in 1929 have been maintained in the Department of Helminthology at Johns Hopkins University since that time and the author of the present paper has made further comparisons between them with regard to egg production. He found that the cat strain of *A. caninum* in cats produced about 2,350 eggs per female worm per day as compared with the normal production of 16,000 eggs produced by the dog strain in dogs. The dog strain in cats produced only 2,340 eggs per female worm per day and the cat strain in dogs produced an average of 11,600 per female worm per day.

These results show that, during the two years which had passed since the completion of SCOTT's work, these strains had maintained their distinct characters and it appears that the differences in egg production are in some way governed by the host and are not inherent in the parasite, a conclusion which was also arrived at by SCOTT with regard to rate of growth and size of mature worms.

E. L. TAYLOR.

McCoy, O. R. (1931). **Immunity of Rats to Reinfection with *Trichinella spiralis*.**—*Amer. J. Hyg.* **14**. 484-494. 3 tables. [3 refs.]

The investigations of previous authors have given rather conflicting results on the development of immunity following infection with *Trichinella spiralis*. The experiments here described, however, conclusively demonstrate that a strong immunity is acquired as a result of infection. This was most strikingly shown where 10 out of 11 previously infected rats survived a test dose which killed 9 out of 11 controls, the resistant rats in this instance having been immunized by nine gradually increasing doses given at weekly intervals.

Further examinations carried out on the intestines of rats within a week of the administration of an infective feed showed that an average of 48·6 per cent. of the larvae which had been given developed to the mature stage in rats which had not previously been infected, while in previously infected rats only 5·8 per cent. were to be found. When this examination of the intestine of immune rats was carried out later than one week after the test dose, no adult worms were found in the intestine and no young larvae were found in the muscles.

A few observations suggest that the degree of immunity may diminish with time, but further work is being carried out on this and on other questions raised by these experiments.

E. L. TAYLOR.

- I. MOHAMMED, A. S. (1931). **The Transmission of Human and Bovine Onchocerciasis.**—*Ann. Trop. Med. Parasitol.* **25**. 509-519. [2 refs.]
- II. SPINDLER, L. A. (1931). **The Development of *Oesophagostomum longicaudum* in the Pig.**—*J. Parasitol.* **18**. 130.
- III. AMEEL, D. J. (1931). **Life History of the North American Lung Fluke of Mammals.**—*Ibid.* 114.

[Papers II and III presented at 7th Ann. Meeting, Amer. Soc. Parasitologists, New Orleans, Dec. 29th, 30th and 31st.]

I. The author of this paper discusses the literature dealing with the transmission and distribution of human and bovine *Onchocerca* and gives a short account of the distribution of *Simulium* in the endemic centres of human and bovine onchocerciasis. This brings him to the rather obvious conclusion that *Simulium* is not unlikely to be an intermediate host of *Onchocerca gibsoni* in Australia and he suggests that Australian workers should follow that line and so "obtain a solution of the problem of transmission, and thus save large sums annually, which are being lost through *O. gibsoni* infestations."

II. Parasite-free pigs were infected by the mouth with the infective larvae of *O. longicaudum*. Encysted parasites were found in the mucous membrane of the large intestine 48 hours later, each cyst containing a single larva and being surrounded by an area of intense inflammation. At the 17th day, fourth stage larvae were found in the lumen of the intestine; on the 35th day, the nodules where the larvae were encysted had almost completely disappeared and, at the 50th day, eggs were found in the faeces showing that the worms had reached maturity.

III. Cercariae from the snail *Pomatiopsis lapidaria* were experimentally proved to be the cercariae of the North American lung fluke *Paragonimus kellicotti*. A short description is given of the cercariae and of the rediae. The cercariae infect crayfishes, localizing in the heart tissues. The mink is regarded as the normal definitive host.

E. L. TAYLOR.

- ROBERTS, F. H. S. (1931). **The Kidney Worm of Pigs.**—*Queensland Agric. J.* **35**. 290-302. 12 figs. on 3 plates. [8 refs.]

This paper gives an account in popular language of the relationship of *Stephanurus dentatus* to disease in pigs and its importance to Queensland pig breeders. A short description of the worm is given together with an account of the organs infested and the lesions produced; the symptoms of heavy infestation

and its result on the pig are described and mention is made of the important points in the life history and the distribution of the worm.

Stephanurus dentatus is known to occur in Queensland wherever pigs are raised and in some areas it causes considerable loss. Returns from abattoirs show that, of 51,774 pigs slaughtered in the period between November, 1930, and February, 1931, 29.5 per cent. were infested; and an investigation has shown that 62.8 per cent. of pigs' livers were recently condemned, 72.1 per cent. of which were discarded on account of kidney worm infestation. The effects are most severe in old pigs because they have had a longer period for the accumulation of parasites.

The distribution and prevalence of the kidney worm is governed by temperature and moisture, high temperature and plenty of moisture being favourable to the development of the larvae. Dryness is particularly fatal to the eggs and larvae and may effectively control the spread of the parasite. Pig premises should be arranged so as to admit the maximum of direct sunlight and all damp places should be thoroughly drained. Small pens should be provided with concrete floors and every effort should be made to drain away the urine and to prevent the pigs from soiling their food by standing in badly constructed troughs or eating it off the ground. Infected premises should be left vacant for five months as it is known that the larvae are able to survive for that length of time. Mud wallows should be eliminated or, if thought necessary for the pigs, should be kept scrupulously clean.

E. L. TAYLOR.

SANDGROUND, J. H. (1931). **Studies on the Life-History of *Ternidens deminutus*, a Nematode Parasite of Man, with Observations on its Incidence in certain Regions of Southern Africa.**—*Ann. Trop. Med. Parasitol.* **25**. 147-184. 5 figs. on 2 plates. [17 refs.]

The author records his observations on *Ternidens deminutus*, a nematode parasite which has previously been recorded from man on only two occasions. Fifteen of 503 South African natives and between 50 per cent. and 65 per cent. of the natives from the south-eastern section of Southern Rhodesia were found to be infected, but it was not found to be present in 54 natives from Northern Rhodesia. There are several records of its occurrence in primates, but the author did not come across it in baboons nor in two species of *Cercopithecus* from the infected region of Southern Rhodesia and an attempt to produce infection in a young baboon was not successful.

The eggs of *T. deminutus* most closely resemble those of *Necator americanus*, but may be distinguished by their larger size, the average being $84.07 \mu \times 51.21 \mu$. The large intestine is the site of infestation and in one instance the worms were found in association with calcareous nodules in the wall of the colon.

Carbon tetrachloride was quite ineffective in some cases, but in others resulted in the expulsion of worms, in one instance as many as 103 specimens being recovered after treatment.

E. L. TAYLOR.

GLASER, R. W. (1931). **The Cultivation of a Nematode Parasite of an Insect.**—*Science*. **73**. 614-615. [2 refs.]

This is a short report on what is believed to be the first successful cultivation of a parasitic nematode throughout its complete life cycle on an artificial medium. Gravid females of the species *Neoapectana glaseri* Steiner, 1929, a parasite of the

Japanese beetle, were placed with a little actively growing yeast on standard meat infusion agar plates containing 1 per cent. dextrose and having a reaction of pH7.4. In the course of two days at room temperature, the surface of the plate became covered with larvae and it was found that each generation required about five days to develop; transfers to fresh medium were made after every second generation. Cultures were kept alive in this way for five and a half months, but at the end of six months they died out. It was repeatedly shown during cultivation that the worms were able to produce a fatal infection in the larvae of the Japanese beetle.

E. L. TAYLOR.

DISEASES, GENERAL.

UNZEITIG, H. (1932). Ueber Tierseuchenvorkommen und die Ergebnisse der Tierseuchenbekämpfung im Gebiete des heutigen Deutschösterreich. [**On the Diseases of Animals and their Control in present-day Austria**].—*Wien. tierärztl. Monatsschr.* **19**. 129-135, 161-172, 193-201 and 225-235. 8 figs., 25 tables.

This detailed work is valuable both historically and with reference to animal husbandry and diseases for a period covering roughly the last 50 years; numerous official and other publications are quoted.

Austria now covers an area of 84,000 sq. km., of which 10 per cent. is unproductive and 42 per cent. woodland; about 23 per cent. is meadow land, 31 per cent. alpine grazing land and the remainder is cultivated.

The majority of farmers are smallholders. The total number of inhabitants is now six and a half million, which is about one million less than in 1910. Animal population statistics are given: since the war there has been a great decrease in the number of horses, cattle and swine and an increase in the number of sheep and goats. The present numbers expressed in thousands are—horses 253, asses 2, cattle 2,312, sheep 272, goats 201 and pigs 1,972.

In 1930 there were 1,013 veterinary surgeons in Austria:

Of the diseases of economic importance, rinderpest and dourine are now only of historical interest and contagious bovine pleuro-pneumonia and sheep pox have not been observed for some years. Foot and mouth disease is still prevalent; the losses are about 3 per cent. in affected cattle, 9 per cent. in affected goats and 27 per cent. in affected pigs.

Anthrax is now uncommon. Blackleg is not very important: only 517 cases of blackleg in all animals were notified in 1930.

1930 was the first year in which no case of glanders was notified. Equine mange has been stamped out since the war, but sheep and goat mange still break out occasionally. Rabies has had only a slight incidence since 1929: it was controlled mainly by legislation.

The position with regard to swine fever is unsatisfactory, there having been an increase in its incidence in the last two years.

Part of the difficulty is due to confusion in distinguishing between swine fever and swine plague. Fresh legislation for control is desirable. Swine erysipelas also causes great losses. Bovine infectious abortion is not notifiable in Austria and the author is sceptical about the usefulness of making it so and questions the value of the Danish control method. The extent of bovine tuberculosis in Austria is still largely unknown.

J. E.

- I. —. (1932). **Report of Committee on Transmissible Diseases of Swine.**—*J. Amer. Vet. Med. Ass.* **80**. 366-370. [15 refs.]
- II. BAKER, D. D. (1932). **Problems confronting Practitioners in Swine Disease Control.**—*Ibid.* 360-366.

I. This Committee restricts its survey to hog cholera, "flu" and infectious abortion; other diseases are dealt with by separate committees.

The Committee points out that, during the present epizootic of swine fever, as has been the case also in previous outbreaks, large numbers of infected pigs are being marketed and that this practice is an important factor in the dissemination of the virus. [In view of the proved viability of swine fever virus in the tissues of preserved carcasses, this is a serious outlook for bacon-importing countries and may result in widespread outbreaks of the disease]. It is becoming increasingly evident that the unsatisfactory results which occasionally follow the serum-virus method of immunization against swine fever are more frequently caused by exposure to or prior infection with intercurrent-diseases than to low grade immune serum or weak virus; the carrying out of vaccination work by laymen is also an adverse contributory factor of considerable importance.

The attention of those engaged in the control of animal diseases is drawn to the increasing number of reports of swine erysipelas received from various parts of the United States.

State sanitary officials are now co-operating with the Bureau of Animal Industry in a sanitation plan for the rearing of healthy pigs and the eradication of round worm infestation, and the results obtained have proved the great value of this scheme.

In view of the economic importance of infectious abortion in swine and the relation of the disease to undulant fever in man, the appointment of a special committee to study methods of control and eradication is recommended.

II. Baker discusses the importance of sanitation in the control of pig diseases. He also stresses the adverse influence of secondary infections on the serum-virus method of immunization against swine fever.

Swine pox is occasionally met with and, although its course is usually benign, in one outbreak the losses were about 10 per cent.

T. M. DOYLE.

- PALMER, C. C. (1932). **Clinical Studies on Retained Placenta in the Cow.**—*J. Amer. Vet. Med. Ass.* **80**. 59-68. 6 tables.

During a period of three years, 44 cases of retained placenta occurred in two herds, of one hundred and of twenty-five cows respectively, both of which were free from tuberculosis and contagious abortion. The duration of retention varied from two to eleven days, being on an average about seven days. In 24 animals the appetite and milk secretion during the two succeeding weeks were regarded as fair and in five some loss of weight was recorded.

It was hoped to leave all entirely untreated, but in four cases, on account of marked loss of appetite, a single uterine injection of two litres of 0.05 per cent. proflavine was given. For each case of retained placenta in either herd, a cow calving at about the same time and not retaining the placenta was selected as a control. All of the control animals calved at full term. Eight of those which retained the placenta had aborted. The mean number of services required to induce the next pregnancy was similar in both groups (2.5 services). In the control group two animals became sterile and four aborted at the next pregnancy;

in the affected group, three became sterile and six aborted. The average period before the next calf was born was 419.5 days in the control group and 429.5 in the affected group. The length of these periods is accounted for by the fact that in both herds cows were not usually bred until three to five months after calving.

A. W. STABLEFORTH.

BECKER, M. (1931). Ueber das Wesen der vaginalen Sterilitätsbehandlung und ihre praktische Durchführung. [**On Vaginal Treatment for Sterility and its practical Application**].—*Berl. tierärztl. Wschr.* **47**. 778-779.

The author, pointing out that the uterus and vagina are physiologically connected, asserts that treatment applied to the latter can also influence the uterus. Sterility is commonly due to uterine atony which can often be overcome by vaginal treatment. The preparation "paratblättchen" (Parenchymatol-zwik-Doppel-blättchen) made by the Atarost, Rostock firm, is recommended for this purpose.

J. E.

I. MAKOWER, Laja. (1931). Les tumeurs spontanées chez les oiseaux. [**Spontaneous Tumours in Birds**].—*Rev. Path. comp.* **31**. 703-719 and 825-854.

II. BAYON, H. P. (1931). **Avian Tumours associated with Retained Yolks in the Oviduct.**—*Vet. Rec.* **11**. 628-630. [19 refs.]

I. Most of this article is taken up with a critical review of the findings of previous investigators. The tumours are grouped and discussed in their histological and regional classes. A special chapter is devoted to lymphoid and myeloid hyperplasias. The lymphoid variety is divided into diffuse and nodular forms, and the symptomatology, morbid anatomy, histology and aetiology of both types are considered. The author finally describes 62 cases examined at the Pasteur Institute of which 27 were lymphoid or myeloid hyperplasias, 13 were sarcomata, 3 lipomata, 2 myomata and 4 were ovarian epitheliomata. A list is given of graftable tumours reproduced by filtrate inoculation, and mention is made of the rare cases recorded of parasitism in bird tumours.

II. This author describes two tumours in the fowl which he considers to have been caused most probably by the irritation of yolk material retained in the oviduct. One was an epithelioma with metastases in the liver; transplant experiments were not successful. The other was a round-celled sarcoma, which he considers should be distinguished from the genuine lymphosarcoma of the fowl on both histological and conditional grounds; transplant experiments were not performed in this case.

NORMAN HOLE.

MOTTRAM, J. C. (1931). **Experiments on the Production of Tumours on the Somatic Mutation Hypothesis.**—*Brit. J. Exp. Path.* **12**. 378-384. 1 text fig. 8 figs. on 1 plate. [6 refs.]

The somatic mutation hypothesis postulates that tumours are the result of mutations of somatic cells. It follows that agents (e.g. X-rays, rays from radium) known to produce genetic mutations and other derangements in the genes of germ cells could be used to put this hypothesis to experimental test. The author

previously showed that high concentrations of carbon dioxide gave rise to derangements of chromosomes.

Pieces of testicle, kidney, spleen and embryonic skin of rats were exposed to a sublethal dose of β radiation and inoculated subcutaneously into rats. Similar pieces of tissue without radiation were inoculated into other rats as controls. Other tissues were kept in high concentration of carbon dioxide and then inoculated.

A sarcoma-like tumour appeared in one rat at the site of inoculation of a testicular emulsion which had been exposed to radiation *in vitro*. This was the only tumour arising from the many experiments of a similar kind.

J. R. M. INNES.

HOU, H. C. (1930). **Further Observations on the Relation of the Preen Glands of Birds to Rickets.**—*Chinese J. Physiol.* 4. 79-92. 7 tables, 1 text fig., 3 figs. on 1 plate. [20 refs.]

It had previously been shown that removal of the preen gland caused a disturbance in the feathers and impairment of general health and that in the case of the young fowl it caused rickets, in spite of normal feeding and sunshine. This paper is a study of the actual existence of vitamin D in the feathers and other tissues of the fowl.

Extracts of feathers, skin and preen gland of normal and rachitic chickens were fed to rachitic rats and the latter were examined radiologically and histologically before and after treatment with the above material for evidence of cure.

The conclusions were that the feathers, skin, fat and muscle of the normal fowl were antirachitic. When the fowls were made rachitic by removal of the preen gland and were kept on a diet low in vitamin D, their feathers, fat and muscle were not antirachitic while the skin was slightly so. Ergosterol was apparently present in the feathers and skin of the normal fowl, but depleted in the feathers of fowls whose preen glands had been removed when young. The non-saponifiable fat-soluble fraction of the feather and skin of the normal fowl was antirachitic. The antirachitic vitamin was stored in the skin, adipose tissue and muscle. The skin was the last depôt to be depleted when the fowl was deprived of the vitamin.

J. R. M. INNES.

ANSELMINO, K. J., & HOFFMANN, F. (1931). Nachweis der antidiuretischen Komponente des Hypophysenhinterlappenhormons und einer blutdrucksteigern den Substanz im Blute bei Nephropathie und Eklampsie der Schwangeren. [An Antidiuretic Component of the Hormone of the Posterior Lobe of the Pituitary and a Pressor Substance in the Blood in Nephrosis and Eclampsia of Pregnancy].—*Klin. Wschr.* 10. 1438-1441. 7 tables. [17 refs.]

HOFFMANN, F., & ANSELMINO, K. J. (1931). Ueber die Entstehung der Nephropathie und Eklampsie der Schwangeren durch Ueberfunktion des Hypophysenhinterlappens. [Hyperactivity of the Posterior Lobe of the Pituitary as a Cause of Nephrosis and Eclampsia of Pregnancy].—*Ibid.* 1442-1445. [21 refs.]

The authors showed that it was possible to demonstrate what was considered to be the active hormone of the posterior lobe of the pituitary in the blood of cases

of nephrosis and eclampsia of pregnancy. Citrated plasma was adjusted to pH 3.9 to 4.3 with acetic acid and filtered through a collodion membrane. In rabbits this substance had an antidiuretic action similar to that of posterior lobe extracts. Similarly it was shown that, in cases of nephrosis and eclampsia with blood pressures above 180 mm., a substance was obtained which on subcutaneous injection had a pressor action in rabbits. This substance was considered to be identical with the vaso-pressor component of the hormone of the posterior lobe of the pituitary.

In the second paper, they compared the effects of the hormone of the posterior lobe of the pituitary with the clinical symptoms in cases of nephrosis and eclampsia of pregnancy when antidiuretic and pressor substances were found in the blood. Complete agreement was found by such comparisons. The most important were oedema, rise in blood pressure, capillary spasms, convulsions, coma and the relief of the symptoms by narcotics. Quantitative determinations of the hormone in the blood in these diseases yielded a parallel between the hormone concentration and the severity of the clinical phenomena. The authors concluded that nephrosis and eclampsia of pregnancy are caused by an uncompensated overproduction of the antidiuretic and vaso-pressor components of the posterior lobe pituitary hormone.

J. R. M. INNES.

IMMUNITY.

- BARR, Molly, & GLENNY, A. T. (1931). **The Preparation of Fractions of Different Antitoxic Quality from the same Serum.**—*J. Path. Bact.* **34**. 539-543. 1 chart, 1 table. [6 refs.]
- BARR, Molly, GLENNY, A. T., & POPE, C. G. (1931). **Some Observations on the Distribution of Antitoxins in Serum.**—*Brit. J. Exp. Path.* **12**. 217-226. 2 charts, 3 tables. [5 refs.]
- BARR, Molly, & GLENNY, A. T. (1931). **Further Observations on Qualitative Differences in Antitoxic Fractions Prepared from the same Sample of Plasma.**—*Ibid.* 337-346. 5 figs., 5 tables. [3 refs.]

These authors have investigated antitoxin distribution in sera, in relation to the protein constituents, by the addition of increasing amounts of solid ammonium sulphate to salt out the proteins. They have examined, in this manner, sera in which the ratio of the *in vivo* test value to the *in vitro* test value exceeds one, is exactly one, and is less than one. By this "salting out" method they separate two qualitatively distinct types of diphtheria antitoxin. One fraction unites firmly to the toxin and reacts rapidly *in vitro* to the flocculation test. The other is detected only by *in vivo* titrations. The *in vivo* to *in vitro* ratio decreased as the amount of salt used was increased, the *in vivo* value being highest in the second, and the *in vitro* value in the fourth fractions salted out (140 to 160 g. and 180 to 200 g. ammonium sulphate per litre respectively).

They found that, in antitoxin precipitated by small amounts of the salt, the *in vivo* to *in vitro* ratio exceeded that of the original plasma; the ratio is high for antitoxin associated with the protein of largest molecular size. The addition of non-antitoxic euglobulin or serum albumen reduced the amount of salt required to remove a given proportion of the antitoxin. A redistribution of antitoxin occurred when sera of dissimilar fractional types (e.g. diphtheria, tetanus and *B. welchii* antisera) were blended.

NORMAN HOLE.

- I. GRATIA, A., & LINZ, R. (1931). Phénomène de Shwartzman et infection vaccinale. [**The Phenomenon of Shwartzman and Vaccinal Infection**].—*C. R. Soc. Biol. Paris*. **108**. 238-240. [4 refs.]
- II. GRATIA, A., & LINZ, R. (1931). Le phénomène de Sanarelli et de Shwartzman dans la neurovaccine et dans la rage. [**The Phenomenon of Sanarelli and Shwartzman in Neurovaccinia and Rabies**].—*Ibid.* 425-426. [8 refs.]
- III. GRATIA, A., & LINZ, R. (1931). Le phénomène de Shwartzman dans le sarcome du Cobaye. [**The Phenomenon of Shwartzman in Sarcoma of the Guinea Pig**].—*Ibid.* 427-428.

I. In a previous paper [(1931). *C. R. Soc. Biol. Paris*. **107**. 1579.], the authors described experiments in which they were able to show that the Shwartzman reaction, which they identify with a similar phenomenon described by SANARELLI, took place when the skin was "prepared" by infection with the virus of vaccinia ("skin preparatory factor") and an inoculation of an active bacterial filtrate ("reacting factor") was subsequently made intravenously. It had been suggested to them that the skin "preparatory factor" in these experiments might have been not the virus of vaccinia, but micro-organisms or their products contained in the vaccinal pulp. In order to negative this possibility, they decided to repeat and extend their earlier experiments using vaccinia virus material, free from bacteria, which they prepared by rabbit testicular passage.

In the first experiment described, four rabbits were inoculated intratesticularly with rabbit testicular vaccinal pulp proved to be bacteria-free. One of the rabbits was kept as a control and the other three received an intravenous injection of 1 c.c. of a filtered culture of *Bact. coli*, 48 hours in one case and 72 hours in the other two, after the testicular inoculation. One of the animals died five hours after the intravenous injection while the other two died 24 hours and 36 hours later after passing blood-tinged stools. On autopsy very extensive haemorrhagic lesions were found in all three, not only in the inoculated testicle, but in the testicle on the opposite side, in both the spermatic cords, the abdominal serous membrane, the thymus and the mesenteric and pelvic lymph glands. The peritoneal cavity was filled with a haemorrhagic exudate. The control rabbit showed no haemorrhagic lesions. In the second experiment the skin of three rabbits was "prepared" by application of testicular vaccine pulp to the epilated and shaved skin of the hindquarters. Three days later when the rabbits showed a typical vaccinal eruption they were inoculated intravenously with 1 c.c. of a *Bact. coli* filtrate. They all died 24 hours later after having given a Shwartzman reaction at the inoculated site. On autopsy the pelvic lymph glands and internal organs were congested and covered with petechiae. The results therefore indicated that vaccinia virus alone was sufficient as a "preparatory factor." The authors point out that as Shwartzman had already suggested, the reaction is not confined to "prepared" skin since, in the experiments described above, it was detected in "prepared" testicle and also spread to lymph glands and the serous membranes of the bladder and intestines.

II. Some rabbits were inoculated intracerebrally with a strain of neurovaccinia virus and others with a strain of "fixed" rabies virus. Subsequently, at a time when cerebral or paralytic symptoms were well-advanced, they were inoculated intravenously with a *Bact. coli* filtrate. Although, on *post-mortem*, haemorrhagic lesions were found in these rabbits in some or all of the following sites—stomach, intestine, diaphragm, lung, kidney, thymus, heart, various lymph glands, parotoid and submaxillary glands and serous membranes—none were

found in the central nervous system. The authors submit these observations without comment and promise a paper later discussing and interpreting the results of their experiments. They add a note to the effect that rabbits with syphilitic orchitis did not develop haemorrhagic lesions when inoculated intravenously with a bacillary filtrate.

III. Fragments of a lipo-sarcoma, a tumour strain showing no tendency to be spontaneously haemorrhagic during the course of development, were grafted into a number of guinea pigs. A few weeks later the developing tumours had reached dimensions varying from the size of a pigeon's egg to that of a hen's egg. 0.3 c.c. of a *Bact. coli* filtrate was then inoculated into the respective tumours of several of the guinea pigs and 24 hours later 1 c.c. of the same filtrate was inoculated intravenously or intraperitoneally. Some of the animals died within the following few days and on autopsy it was found that their tumours showed a haemorrhagic reaction, and that the part of the tumour affected resembled a blood clot as compared with the whiteness of the remainder. Other animals did not die till later and in these cases also the tumours showed areas of necrosis and even actual liquefaction with a surrounding zone of vascular proliferation.

In a later experiment, guinea pigs with well-developed tumours received 1 c.c. of bacillary filtrate intravenously without previous "preparation" of the tumour. Similar haemorrhagic reactions confined to the tumour were observed in these animals also. None of the internal organs showed any haemorrhagic lesions.

The authors suggest that, since the reaction was brought about in this last case without any "preparation" of the tumour, it is an argument in favour of the virus theory of cancer. [?].

I. A. GALLOWAY.

JENSEN, C. (1931). Rapport entre la réaction de Schick et le taux d'antitoxine dans le sang. [**The Relationship between the Schick Test and the Antitoxic Value of the Blood**].—*C. R. Soc. Biol. Paris*. **108**. 539-542. [1 ref.]

JENSEN, C. (1931). Réaction de Schick et taux d'antitoxine chez les enfants vaccinés par une injection unique d'anatoxine diphtérique purifiée et concentrée. [**The Schick Test and the Antitoxic Value in Children vaccinated by one Injection of Purified and Concentrated Diphtheria Anatoxin**].—*Ibid.* 543-545. 1 chart.

JENSEN, C. (1931). Sur l'importance de la réaction de Schick positive chez des enfants non immunisés et des enfants immunisés avec l'anatoxine diphtérique. [**The Importance of a Positive Schick Test in Non-immunized Children and in Children immunized with Diphtheria Anatoxin**].—*Ibid.* 552-554. [3 refs.]

JENSEN, C. (1931). Sur l'importance de la réaction de Schick négative chez des enfants non immunisés et des enfants immunisés avec l'anatoxine diphtérique. [**The Importance of a Negative Schick Test in Non-immunized Children and in Children immunized with Diphtheria Anatoxin**].—*Ibid.* 555-558. [5 refs.]

JENSEN, C. (1931). Réaction de Schick et taux d'antitoxine du sang des enfants ayant été soumis trois ans auparavant à une vaccination par l'anatoxine diphtérique. [**The Schick Test and the Antitoxic Value of the Blood of Children who had been vaccinated three years ago with Diphtheria Anatoxin**].—*Ibid.* 577-578. [1 ref.]

The author notes that, whereas considerable investigations have been made on the subject of the Schick test-antitoxic value relationship, most of the work

has been done with subjects that have not been artificially immunised against diphtheria. He therefore gives an account of the studies he made when vaccinating a large number of children between the ages of two and fourteen.

In general his results may be summarized as follows :—

(1) A positive Schick reaction definitely indicates an antitoxic serum content of less than 0.03 A.U. per c.c., and in 96 per cent. of cases, less than 0.01 A.U.

(2) Children whose blood contains very little antitoxin (less than 0.0005 units) can nevertheless give a negative reaction.

(3) Naturally Schick-positive subjects have a serum content of 0.005 units or less, depending somewhat on the severity of the reaction. After vaccination, children remaining Schick-positive usually show about 0.025 A.U. in the serum.

(4) The incidence of natural Schick-negative cases with a very low antitoxic serum content may explain recorded cases of diphtheria in Schick-negative subjects, but the turning of a Schick-positive child into a Schick-negative child stimulates a serum antitoxin production of more than 0.01 units per c.c. in 91 per cent. of cases.

(5) The results of Schick testing three years after diphtheria vaccination do not show any definite correlation between the test and the antitoxic content.

The author describes some interesting and unusual cases, and concludes that it is not possible to group children with certainty as Schick-positive or Schick-negative according to their serum antitoxic content, and that the "Schick level" does not really exist, owing to considerable individual variations. It appears to be necessary to estimate the antitoxic value as well as perform a Schick test in order to decide which children should be vaccinated.

NORMAN HOLE.

MAITRA, G. C., & MALICK, S. M. K. (1931). **Experimental Observations on Cholera 'Phage Lysate as a Component of Prophylactic Cholera Vaccine.**—*Ind. J. Med. Res.* **19**. 701-704. 1 table. [5 refs.]

From the results of their experiments, the authors conclude that the 'phage lysate of cholera vibrio in 1 to 3 c.c. doses, given subcutaneously, is innocuous to rabbits. Administered subcutaneously in the above doses it afforded no protection to rabbits against one and a half times the minimal lethal dose of cholera vaccine given intravenously 15 days later. The addition of the lysate to the standard cholera vaccine, when inoculated into rabbits, did not enhance the bactericidal power of the blood.

It appeared that the agglutination titre of the sera obtained from these rabbits was not always proportional to the bactericidal power.

[According to the table given, in four out of six cases the addition of lysate to the standard cholera vaccine appeared to have increased the agglutinating titre of the serum of inoculated rabbits, although, by the technique employed, no increase in bactericidal power was demonstrated.]

I. A. GALLOWAY.

I. SORDELLI, A., & MAYER, Elvira. (1931). **L'Agar comme antigène *in vitro*.** [**Agar as an Antigen *in vitro***].—*C. R. Soc. Biol. Paris.* **108**. 675-676.

II. FORGEOT, P., & GOLDIE, H. (1931). **Caractères antigènes du bouillon des viandes de conserves.** [**The Antigenic Character of Broth prepared from Preserved Meats**].—*Ibid.* 729-731.

I. The intravenous inoculation of serum-agar cultures of *B. anthracis* will produce an antibody against the agar as well as against the bacillus. The authors

have demonstrated this reaction by precipitin tests, and have separated the bacillary precipitin from the agar precipitin by absorbing the serum with *B. anthracis*. All the commercial samples of agar tested gave the same reaction and the antigen appeared to be soluble in water, precipitated by alcohol and resistant to alkalies, but it was destroyed by acids. The agar precipitins, like those of *B. anthracis*, were found to be in the euglobulin serum fraction.

II. These authors have considered the effects of age on the antigen-antibody reactions of tinned beef. They have inoculated rabbits to produce the antisera and prepared the antigens from beef preserved on known dates. Their results show that the precipitin-stimulating power deteriorates with prolonged conservation, but that, in *in vitro* tests with a specific serum, the age of the antigen principle had little effect. The zonal phenomenon of MICHAELIS was observed. The sera produced, however, fixed the complement irrespective of the age of the material used. This test is considered a possible means of estimating the age of preserved meat.

NORMAN HOLE.

PUBLIC HEALTH.

FOOY, J. P. (1932). Over het Hygienisch Toezicht op melkerijen te Soerabaja en het Kiemgehalte van Soerabajasche Marktmelk. [*Inspection of the Dairies in Soerabaja and the Bacterial Content of the Soerabaja Market Milk*].—*Tijdschr. Diergeneesk.* 59. 272-280.

The author gives a series of figures showing the results of examination for bacteria of a considerable number of samples of milk, and these reveal an unsatisfactory state of affairs. The results were definitely bad.

A. LESLIE SHEATHER.

THERAPEUTICS.

TILLEY, F. W., & SCHAEFFER, J. M. (1931). Germicidal Efficiency of Mixtures of Phenols with Sodium Hydroxide, with Glycerin, and with Ethyl Alcohol.—*J. Agric. Res.* 43. 611-617. 4 tables. [9 refs.]

The authors examined phenol, ortho- and para-cresol, ortho-phenylphenol, thymol and *n*-hexyl-resorcinol with admixture of sodium hydroxide, alcohol and glycerin respectively against *S. aureus* and *Bact. typhosum*.

Up to the point of chemical neutralisation of the lower phenols, the alkali causes a decrease in germicidal power, but at higher strengths an increase, due in part to the alkali, is to be noted. Alkali exercised little effect on thymol probably by reason of the higher degree of dissociation due to the greater dilution (10 to 50-fold) as compared with the lower phenols.

Glycerin inhibited the activity of all the phenols used; alcohol increased the efficiency of the lower, but depressed that of the higher phenols, whilst soaps (cocoanut and castor) tended to counteract the inhibitory effect.

G. D. LANDER.

SABALITSCHKA, Th., & BÖHM, E. (1932). Ueber die Sterilisation und Sterilhaltung von Normalserum mit Phenol, Trikresol und Nipasol. [*The Sterilization and Maintenance of Sterility of Normal Serum with Phenol, Tricresol and Nipasol*].—*Zlb. Bakt. I. (Orig.)*. 123. 351-355. 4 tables. [12 refs.]

The authors tabulate comparative tests of the germicidal effects of phenol, tricresol and nipasol in the sera of the horse, ox, and sheep, using *S. pyogenes*

aureus, *Bact. coli* and *Bact. paratyphosus*. Nipasol is the [ethyl] ester of p-hydroxybenzoic acid, and is employed in the form of its soluble sodium compound. In general, the germicidal effects of nipasol are superior to those of the other agents to the extent of some 10 per cent. reckoned on the actual concentrations. The greatest advantage appears to be that nipasol is non-toxic to man and animals and that it does not produce any precipitate of albumen from the serum.

G. D. LANDER.

OKELL, C. C., & PARISH, H. J. (1931). **The Effect of Sodium Aurothiosulphate in the Treatment of Tuberculosis in Guinea-Pigs.**—*Brit. J. Exp. Path.* **12**, 186-188. [11 refs.]

The authors point out that since the publication of MØLLGAARD's monograph ("Chemotherapy of Tuberculosis." Copenhagen 1924) the question of the influence of sodium aurothiosulphate upon tuberculosis of small animals has been the subject of numerous conflicting papers [recognised pharmaceutical name is "sanocrysin" and formula is $\text{Na}_3\text{Au}(\text{S}_2\text{O}_3)_2 \cdot 2\text{H}_2\text{O}$].

MØLLGAARD (1924) himself described apparently successful treatment of tuberculosis of guinea pigs. MADSEN and MORCH (1926), and CUMMINS (1926) reported favourably on tuberculosis of the rabbit but BANG (1926, 1927) and BJORN-HANSEN (1927) as well as CALMETTE, BOQUET and NÈGRE (1926) failed to confirm these findings. The Japanese Research Committee on Sanocrysin (1927) was unable to prevent the development of tuberculosis in rabbits, rats and guinea pigs, although they formed the opinion that the advance of the disease was retarded by treatment with the drug.

The present authors conducted critical tests on guinea pigs by dropping estimated doses of *B. tuberculosis* into the eye, so securing a slow progress of the disease combined with assurance of eventual death from general tuberculosis in all animals which did not die of intercurrent infections.

The animals were given successive doses of the drug intraperitoneally (5 mg. on day of infection and 10 mg. doses on 4th, 11th, 20th and 24th days) so "saturating" them with sodium aurothiosulphate while an inoculum close to the minimum infective dose was being allowed to develop. As compared with controls no evidence of protection could be obtained and it is concluded that tuberculosis of guinea pigs cannot be influenced by sanocrysin treatment.

H. H. GREEN.

COLLIER, W. A. (1931). Versuche über der Einfluss der Bestrahlung auf Trypanosomen und Bakterien. [Investigations on the Influence of Irradiation on Trypanosomes and Bacteria].—*Zeitschr. Hyg. u. Infektkr.* **112**, 724-731. [7 refs.]

Trypanosomes (*T. brucei*) in solutions containing 2 per cent. blood were killed in 25 seconds by exposure to the rays of the Osram solar lamp; in 4 per cent. blood solutions they remained motile after 120 seconds, but lost their power of infectivity.

Even after five seconds exposure, some alterations of antigenic property occurred, as the power of producing immunity was altered. This was shown by cross immunity experiments with normal and irradiated strains.

Motile bacteria retained their motility after 48 hours' exposure, but multiplication was inhibited.

U. F. RICHARDSON.

MARCOVITCH, S., & ANTHONY, M. V. (1931). **A Preliminary Report on the Effectiveness of Sodium Fluosilicate as compared with Borax in Controlling the House Fly (*Musca domestica* Linné).**—*J. Econ. Entomol.* **24**, 490-497. 1 fig., 2 tables. [7 refs.]

In a large number of insecticide tests borax was found to be inferior to sodium fluosilicate. Neither were found to be capable of destroying ova. The action of these agents is exerted on larvae and adults when the treated manure is eaten. Whereas borax may prove harmful to sensitive plants like citrus, sodium fluosilicate has no detrimental effect on vegetation in amounts up to 300 lbs. per acre. As young maggots are more easily killed than mature ones, the best results are obtained by sprinkling manure daily. A saturated solution (1:154) of sodium fluosilicate should be used.

U. F. RICHARDSON.

POISONS AND POISONING.

STEYN, D. G. (1931). **The Toxicity of the Pupae of the Moth *Nudaurelia cytherea*.**—*17th Rep. Direct. Vet. Serv. & Anim. Indust., Union of S. Africa. Part I.* pp. 423-429. 1 text fig. Pretoria: Govt. Printer.

On account of enormous damage to pine plantations caused by the caterpillars of this moth, pigs were allowed to run in order to destroy the pest. The pupae, which average about 11 g. in weight, were eaten freely, but caused dullness, inappetence and death within three days.

Rabbits were killed within two days by as little as 10 g. of minced pupa (*per os*) and a four months' old pig by 200 g., in spite of profuse vomiting within half an hour of administration.

From tests made by injection of concentrated extracts into guinea pigs, it appeared that the toxic principle is extracted from the pupae by ether, water and chloroform, but not by absolute alcohol.

The symptoms and lesions were those of a gastro-intestinal irritant.

G. D. LANDER.

LUY, P., & THORMÄHLEN, E. (1931). Beitrag zur Fluorose des Rindes [**Contribution to Fluorine Poisoning in Cattle**].—*Arch. wiss. prakt. Tierhkl.* **64**, 144-151. 4 tables. [16 refs.]

The authors performed experiments in order to determine the toxic dose for cattle of fluorine and alkaline compounds, such as are present in smoke from industrial works.

Osteodystrophic troubles have been found in cattle feeding on pasture subjected to such smoke in the neighbourhood of Hanover [see HUPKA & GÖTZE, this *Bulletin*. **1**, 253].

Four cows were available: all were fed on normal rations and three of them were given daily doses of flue dust ("flugstaub") in increasing doses over a period of 71 days. The dust was supplied by foundries and was analysed for its content of caustic soda, sodium carbonate and fluorine. The first cow received in all 823 g. caustic soda and 140 g. sodium carbonate in a dilute watery solution: the second cow received 1,698 g. sodium carbonate, and the third cow was dosed with a mixture of three kinds of flue dust which contained fluorine and an alkaline content corresponding to 0.267 g. sodium carbonate per gramme of dust.

The body weights of the animals were recorded and the blood was examined regularly for the alkali reserve and for calcium, phosphorus, nitrogen and sugar contents. No loss of weight occurred and the blood calcium, phosphorus and sugar remained normal. In the first two test cows, there was a slight loss in the blood-alkali reserve and, in the second pair of test cows, the nitrogen content showed great fluctuation. No sign of osteodystrophic lesions developed in any animal. The authors conclude, therefore, in agreement with GÖRZE, that the harmfulness of flue dust to animals is due to indirect action and that it is related to influences exerted on the soil and herbage.

J. E.

KLARENBECK, A., VEENENDAAL, H., & VOET, J. (1931). Toxicologische Proeven bij Kippen, met Acidum Arsenicosum, Chili- en Kalisalpeter. [Toxicological Tests on Fowls with Arsenious Acid, Chile- and Potassium Salt-petre].—*Tijdschr. Diergeneesk.* **58**. 1265-1272. [1 ref.]

The authors have re-determined the toxic dosage of arsenious oxide for fowls at from 100 to 150 mg. per kg. body weight. These doses cause death within six days with symptoms and lesions of gastro-enteritis. Seven daily doses of 10 mg. led to no symptoms or notable loss of weight, but a single dose of 100 mg. caused loss of weight in 10 days without, however, characteristic symptoms or lesions.

Potassium nitrate was found to be more toxic than the corresponding sodium salt, each producing symptoms on dosage for a few days with from 1 g. to 1.5 g. in capsule or solution.

G. D. LANDER.

PHYSIOLOGY.

HELLER, H., & HOLTZ, P. (1932). The Significance of the Pituitary in Parturition.—*J. Physiol.* **74**. 134-146. 8 figs. 2 tables. [30 refs.]

DIXON and MARSHALL (1924) suggested that pituitrin is secreted at the end of pregnancy under the stimulus of certain substances stated to have their origin in the ovary thus stimulating the uterus and leading to parturition. Other investigators, BOURNE and BURN (1928) and PARKES (1930), have denied this, suggesting that some hormone sensitizes the uterus to the action of pituitrin.

The authors of this paper conducted experiments to determine the sensitization of the uterus by oestrin rather than by an increase in the amount of pituitrin in the blood. In addition they investigated the influence of the K/Ca ratio and anterior pituitary hormone to the isolated uterus, since alterations in both these factors are found in pregnancy. The experiments were conducted on the isolated uteri of guinea pigs.

Other workers had shown that previous treatment of the isolated uterus by pituitrin reverses the normal effect of adrenalin of relaxation to contraction. This method was therefore used for detecting changes in the activity of the posterior lobe of the pituitary during pregnancy.

Their main conclusions were that adrenalin relaxes the uterus during the greater part of pregnancy and stimulates it shortly before delivery. Protein-free oestrin (prognon) and crystalline oestrin have no sensitizing action for pituitrin on the isolated uterus. Protein-free preparations of the anterior lobe hormone prepared from urine (prolan or praehormone) sensitize the uteri of infantile and

pregnant guinea pigs to pituitrin. Changes of the K/Ca ratio of the bath sensitize the uterus to pituitrin if K is predominant.

These results indicate that not only an increase in the secretion of pituitrin, but also an increased sensitivity of the uterus to pituitrin occurs at the end of pregnancy and that it may be an important factor in determining the onset and progress of parturition. These findings also suggest that, during the second half of pregnancy when the *corpora lutea* are degenerating and their inhibitory action is disappearing, labour is induced by a stimulus of a comparatively small increase of pituitrin on a uterus sensitized to its action by a combination of factors such as the increase of anterior pituitary and the alteration in the K/Ca ratio.

J. R. M. INNES.

GENTHER, Ida T. (1931). **Irradiation of the Ovaries of Guinea Pigs and its Effect on the Oestrous Cycle.**—*Amer. J. Anat.* **48**, 99-137, 11 figs. on 3 plates. [33 refs.]

Long exposure with filtered X-rays and short exposure with unfiltered X-rays produced degeneration of large and small follicles together with the contained ova and subsequent hypertrophy of the *theca interna*. A few primordial follicles remained in the ovary and new follicles continued to mature. These were usually atretic and ovulation was rare, *pseudo-corpora lutea* being sometimes formed. Irregular oestrous cycles occurred in association with one large ovarian follicle and typical oestrous changes in the genital tract and mammary gland. In nearly half of the cases, short exposure of unfiltered X-ray caused marked ovarian fibrosis, absence of a sexual cycle and a continuous resting condition. In all cases the follicular elements were first affected. The *corpora lutea* were very resistant to the action of the X-rays. The experiments support the view that the follicular hormone initiates oestrous and that the *corpus luteum* regulates the sexual cycle, preventing ovulation and tending to counteract the effect of the follicular hormone.

J. R. M. INNES.

BECKER, M. (1932). Zur biologischen Schwangerschaftsdiagnose der Stute nach Zondek. [**On the Biological Diagnosis of Pregnancy in the Mare by Zondek's Method.**]—*Deuts. tierärztl. Wschr.* **40**, 7-8.

The author modified the Ascheim-Zondek reaction by diluting the urine from mares with an equal volume of normal saline and injecting from 0.6 to 1.2 c.c. into infantile female mice. The results obtained were better than with the original A-Z method, as pregnancy in the mare was first diagnosed on the 42nd day after conception (49th day with original method).

The author also experimented to find whether the blood contains the hypophyseal luteinising hormone; for that purpose he used his modified A-Z test and obtained a positive result in one case.

J. E.

WAGNER, H. (1931). Statistisch-Klinische Untersuchungen über die Brunst beim Rinde. [**Statistical Clinical Investigations into Heat in Cattle.**]—*Deuts. tierärztl. Wschr.* **39**, 680-683 and 777-782, 4 tables. [6 refs.]

Investigations were made into the intervals between two heat periods in a herd of cattle. Out of 393 intervals, 70 per cent. were of 18 to 24 days' duration and 22 per cent. were of 25 to 31 days' duration. The length of the 3-week as well

as the 4-week cycle was not constant in the same animal. The variation in the length of the interval was related to either time of year, age or weight. Shorter intervals occurred in summer than in winter; the mean value of the interval in the summer months was 22·3 days in contrast to 22·6 days in the winter. In very young animals and in old animals there were longer periods between the heats than in the other cattle. In animals between the ages of 2½ and 5 years, a mean value of 22·6 days was obtained; in those between the ages of 12 and 16 years, the interval was 22·3 days; and in cows between the ages of 5 and 8 years and 8 to 12 years, mean values of 21·9 and 22·2 days respectively were obtained. Heavy animals showed longer intervals than those of lighter weights.

The second part of the paper gives a detailed sexual history of 5 cows from the same herd of 62 cattle utilised over a period of years in the previous investigations. The cases are considered to be typical of the whole of the herd. The main points noted were, date and length and intervals between heat periods and calving dates. These are given in tabular form and are compared. The author concludes that the course of the sexual function of the cow is subject to an established regularity and that the animal maintains the periodicity which it assumes from the beginning. Irregularity is caused by disturbances in the reproductive organs. These results are in agreement with the work of other authors on the mare.

J. R. M. INNES.

FREI, W. (1932). Die innersekretorischen Zusammenhänge der Nymphomanie des Rindes. [**The Relation between Internal Secretion and Nymphomania in Cattle**].—*Schweiz. Arch. Tierhkl.* **73**. 537-550. [22 refs.]

This is a discussion of nymphomania in cattle from the point of view of disordered physiology and in the light of the recent advances in the knowledge of the various hormones connected with reproductive function.

Nymphomania can be classified as follows:—(1) that occurring with ovarian cysts; (2) that occurring without ovarian cysts; (3) that incurable by ovariectomy and therefore probably of extra-genital origin, and (4) that which expresses itself not as perpetual heat, but as protracted heat appearing at regular or irregular intervals.

Oestrus is induced by the maturation of an ovarian follicle and ceases on rupture of the latter. Follicular development is probably controlled by the anterior lobe pituitary hormone so that any abnormalities of the latter must interfere with the former. The essential feature in the origin of the cysts is the disturbance in the mechanism of ovulation which can be primarily related to the ovaries [local disease processes] or be extra-ovarian (as mentioned above, due to anterior lobe disturbance). Diseases of the anterior lobe may arise through the agency of endogenous or exogenous factors.

The author also discusses the influence of nutrition and general health on ovarian activity.

J. R. M. INNES.

I. VALADE. (1930). L'Equilibre acido-basique de l'organisme et ses troubles. [**The Acid-Base Equilibrium of the Organism and its Disorders**].—*Rev. vét. milit.* **14**. 347-364. 3 text figs. [10 refs.]

II. DIMOCK, W. W. (1931). **Acidosis of Pregnant Ewes**.—*Vet. Med.* **26**. 268-270.

III. INGRAM, J. T., & FOWWEATHER, F. S. (1931). **Acidosis and Seborrhoea**.—*Brit. Med. J.* May 16th. 839-841. [8 refs.]

I. The first of these three papers is a general review discussing the significance of the hydrogen ion concentration of physiological fluids, the constancy of reaction of the blood, the mechanisms for regulating the acid-base equilibrium of the body, the methods of measuring pH and alkaline reserve of the blood and the pathological conditions associated with acidosis and alkalosis.

II. The second is a report of an address by W. W. Dimock given at the 12th Annual Illinois Veterinary Conference. Cases are described from Kentucky and the disease corresponds to the preparturient paresis of ewes. The evidence supplied for the author's belief that the disease is of nutritional origin is very meagre, and the observed acid reaction of the urine might well have been ascribed simply to cessation of feeding.

III. In this paper the authors discuss the general problem of seborrhoea, with reference to constitutional factors, an infecting factor, and precipitating factors. They discuss their own study of 26 cases with reference to the carbon dioxide-combining power of the blood (alkaline reserve) and the titratable acid of the urine.

They find no evidence to suggest the presence of acidosis in persons subject to seborrhoeic disorders and no evidence to support the alkali treatment except where this may be independently indicated by the nature of the precipitating cause of the attack.

H. H. GREEN.

McSWINEY, B. A., & ROBSON, J. M. (1931). **The Sympathetic Innervation of the Stomach. II. The Effect of Stimulation of the Peri-arterial Nerves on the Stomach and Small Intestine.**—*J. Physiol.* **71**. 194-200. 4 figs., 2 tables. [7 refs.]

McSWINEY, B. A., & ROBSON, J. M. (1931). **The Sympathetic Innervation of the Stomach. III. The Interaction of the Vagus and Sympathetic Nerves.**—*Ibid.* **73**. 141-150. 5 figs. [12 refs.]

BROWN, G. L., & McSWINEY, B. A. (1932). **The Sympathetic Innervation of the Stomach. IV. Reversal of Sympathetic Action by Luminal.**—*Ibid.* **74**. 179-194. 7 figs. [19 refs.]

[BROWN, McSWINEY and WADGE (1930) *J. Physiol.* **70**. 253. described the effects on the stomach of stimulation of the thoracic sympathetic trunk. They showed that stimulation with a weak faradic current at a frequency of 1 per second caused contraction, while stimulation with a tetanizing current caused relaxation. They concluded that the body of the stomach receives motor and inhibitor fibres from the sympathetic chain which can be influenced to a greater or lesser degree by the varying types of stimulation].

The first paper of this series deals with the effect of stimulation of the vagus and peri-arterial nerves supplying smooth muscle preparations and affords further evidence to demonstrate that motor and inhibitor effects may be obtained from the smooth muscle of the stomach on stimulation of sympathetic nerves. Isolated strips of smooth muscle of the stomach and small intestine innervated by peri-arterial nerves of cats and rabbits were prepared. Stimulation of the nerves with a frequency of 1 to 12 break induction shocks per second caused muscle contraction; with 20 to 50 per second relaxation was obtained. The motor response was abolished by ergotoxine and atropine. The movements of the intestine were inhibited by all types of stimulation. It was concluded that the motor and inhibitor response was due to sympathetic fibres in the peri-arterial nervous network.

The second paper deals with the effects of stimulation of the vagus and peri-arterial nerves supplying smooth muscle preparations and demonstrates first the sympathetic response during vagus stimulation and secondly the inhibitory action of the sympathetic on the vagus response. Experiments are described which show that the response of the smooth muscle to stimulation of the peri-arterial nerves may be reversed by stimulation of the vagus. Inhibition of the vagus response was produced by stimulation of the peri-arterial nerves.

The third paper shows that luminal (phenyl ethyl barbituric acid) abolished the inhibitor effect on the stomach of stimulation of the thoracic sympathetic chain and that after anaesthetizing the animal with this substance the inhibitory effect was converted to contraction. Though sympathetic stimulation after luminal caused augmentor effects, relaxation was still obtained with the vagus. Luminal did not reverse the response normally obtained with the sympathetic from the pyloric antrum and small intestine. The action is claimed to be peripheral. It is suggested that the sympathetic acts by liberating a substance which by excitation or inhibition acts on the stomach muscle. The direction of the action depends on the rate of liberation and action on the tissue. Luminal acts by depressing the rate of production and action.

J. R. M. INNES.

CLARK, S. L. (1931). **Innervation of the Pia Mater of the Spinal Cord and Medulla.**—*J. Comp. Neurol.* **53**, 129-145. 12 figs. [11 refs.]

This is a detailed description of the innervation of the *pia mater* of the spinal cord and medulla in cats. This structure is supplied with numerous bundles of nerve fibres myelinated and unmyelinated, the majority of which extend parallel to the long axis of the cord. Exclusive of vasomotor nerves to the muscle of the arterial system, the nerve fibres end on the *pia mater* and on or near blood vessels in sensory terminations. Exclusive of nerve fibres accompanying blood vessels on to the membrane, fibres enter the spinal *pia mater* from the white matter of the cord as well as from both dorsal and ventral roots of the spinal nerves. Most of the nerves of the spinal *pia mater* are unrelated to blood vessels either in course or termination.

J. R. M. INNES.

FISH, E. W. (1931). **The Reaction of the Dental Pulp to Peripheral Injury of the Dentine.**—*Proc. Roy. Soc. (Ser. B.)* **108**, 196-208. 17 figs. on 6 plates. [6 refs.]

The author previously showed that there is a free fluid path along the dentinal tubules in a space between the fibrils of Tomes and the wall of the tubules and that peripheral injury of the dentine causes stasis of the contents of the injured tubules. The tract of the tubules involved becomes cut off from fluid communication with the pulp by a deposit of secondary dentine and must be regarded as a dead tract of dentine. The barrier between primary and secondary dentine consists of a deposit of calcium salts.

This paper concerns the nature of the reactions in the pulp which lead to the isolation of such an injured tract of dentine. The method by which these reactions were investigated consisted of cutting cavities in the sound dentine of monkeys and dogs and either filling the cavities with cement or leaving them open in the mouth. The animals were killed at various periods and serial sections were made of the dentine and pulp *in situ*.

After an experimental injury to the periphery of the dentine the following reactions occur in the pulp. The odontoblasts associated with injured tubules degenerate and most of them die and disappear; the remainder show regenerative changes and return to normal, laying down the tubules in the secondary dentine. The number of tubules in the secondary dentine depend on the number of surviving odontoblasts. If none survive, the secondary dentine is hyaline; an embryonic type of cell may appear after a few weeks at the development of the secondary dentine. Haemorrhages in the pulp and round-cell infiltration and capillary invasion of the odontoblasts occur. In still more severe injuries, small marginal granulomata of the pulp appear in contact with the injured tubules instead of the normal secondary dentine formation. Death of the pulp may follow the most severe peripheral injuries of the dentine. The secondary dentine always corresponds in its distribution to the tract of the tubules which have been injured and is a specific reaction to peripheral injury of the dentine.

J. R. M. INNES.

MUIR, R., & YOUNG, J. S. (1932). **The Relation of the Liver to the Disposal of Haemoglobin.**—*J. Path. Bact.* **35**. 113-125. 2 figs., 2 tables. [11 refs.]

The authors induced experimental "acute" and "chronic" haemoglobinæmia in rabbits by single and repeated injections of haemoglobin. The animals were killed at various times after injection; the bile was examined for the presence of haemoglobin and the liver, kidneys and spleen were examined histologically by microchemical methods for the detection of iron deposits in the form of haemosiderin.

The results showed that haemoglobin was not excreted in the bile nor taken up by the liver cells or Kupffer cells. This was in contrast to the fact that, as a result of the haemoglobinaemia, the cells of the kidney gave a distinct iron reaction (Prussian blue test) at a very early stage. The deposits were mostly observed in the convoluted tubules; no trace could be found in the glomeruli and periods of two to three days elapsed before haemosiderin was detected in a granular form. The spleen did not show the characteristic swelling which occurs as a result of haemolytic poisons.

In "chronic" haemoglobinaemia (repeated intraperitoneal injection of haemoglobin) an increase in the iron content of the liver did occur slowly, but did not reach the amount met with in the anaemia produced by haemolytic sera. The outstanding feature was the large accumulation of granular haemosiderin in the kidneys, particularly in the cortex. The spleen also showed distinct haemosiderin deposition.

The experiments as a whole did not give support to the view that haemoglobin is taken and broken up by the cells of the liver.

J. R. M. INNES.

COLLINS, D. C. (1932). **Formation of Bone Marrow in the Suprarenal Gland.**—*Amer. J. Path.* **8**. 97-107. 2 tables, 3 figs. on 1 plate. [30 refs.]

The formation of bone marrow in the human body in sites other than the bone is frequently observed in old age, particularly in the presence of ossification of the laryngeal cartilages. Fifteen cases of formation of bone marrow in the suprarenal gland have been collected from the literature and the salient features are discussed, together with an additional case observed by the author. Theories concerning the origin of these extra-medullary haemopoietic centres are considered.

J. R. M. INNES.

FLEISCHMANN, W., & POLLACZEK, K. F. (1931). Zur Prüfung der Vitalität von Leukocyten mittels Farbstoffen. [The Vitality of Leucocytes tested by the Staining Reactions].—*Klin. Wschr.* 10. 1808-1810. [21 refs.]

The authors compared the Seyderhelm staining method for differentiating dead and living leucocytes with supravital staining with neutral red. The former is a colloidal dye mixture of Congo red and trypan blue and does not stain living cells, but stains damaged and dead cells. Neutral red, on the other hand, stains granules in the cytoplasm of the living cell and leaves the nucleus unstained; death of the cell causes the nucleus to take on an intense red colour. Leucocytes from various conditions were stained by the above methods and compared.

While leucocytes stained by Seyderhelm's method always showed parallel staining of the nucleus with neutral red and were therefore dead, some leucocytes which were not stained by the Seyderhelm mixture showed nuclear staining with neutral red. The authors conclude, therefore, that the Seyderhelm method is not reliable as a vitality test. Absence of staining does not always indicate that the cell is living, while a positive staining effect is simply evidence of *post-mortem* structural changes in the cell.

J. R. M. INNES.

WRIGHT, G. P., & VAN ALSTYNE, Margaret. (1931). The Development of Primitive Avian Corpuscles on Incubation in vitro.—*Folia haematol.* 46. 26-36. 5 tables. [25 refs.]

Centrifugation of blood for separating various types of cells has frequently been employed. The authors used this method for separation of primitive and final corpuscles. Samples of blood were taken from hens after experimental anaemia had been produced either by intermittent haemorrhage or by injection of phenylhydrazine hydrochloride. The blood was centrifuged in tubes with the ends drawn out in coarse capillaries. After centrifugation, smears were made of the cells at different levels of the capillary part of the tube and resuspended in their own serum; the smears were stained by Wright's stain for differential counts of the various types of primitive cells present. The more primitive the type of cell the slower was its rate of sedimentation and the greater its tendency to accumulate near the upper end of the cell mass on centrifugation. Suspensions containing large numbers of the more primitive varieties were incubated and it was shown that a progressive development into more advanced forms took place. The development into the final stage of red cell maturation was not quite complete in 36 hours. The authors consider that in the circulation the primitive cells have undergone their developmental transformation in less than 80 hours. The maturation of fowl's blood cells takes a shorter time than the equivalent development of mammalian cells.

Comparisons of the haemoglobin content of specimens of blood which contained divergent proportions of the primitive red blood cells are presented and the conclusions were drawn that basophilic staining characteristic of the more primitive cells was no indication of any lack of haemoglobin. The primitive cells possessed almost as much as the ordinary red corpuscles.

The differences in the sedimentation rate on centrifugation were related to differences in the density in which haemoglobin was present in cells at various stages of development, i.e. to differences in "saturation index" $\left\{ \frac{\text{colour index}}{\text{volume index}} \right\}$ and not to differences in the haemoglobin content of the cells.

These primitive cells had a high rate of metabolism, exhibited considerable resistance to mechanical injury and were readily susceptible to accurate aliquot sampling; they are thus valuable for the investigation of many aspects of cell physiology.

J. R. M. INNES.

BONGERT, J. (1931). Die Bedeutung der Vitaminfrage für die Haltung und Aufzucht der landwirtschaftlichen Nutztiere. [**The Significance of Vitamins for the Domesticated Animals**].—*Tierärztl. Rdsch.* **37**. 1-4, 17-21 and 33-37. 4 text figs., 3 tables. [9 refs.]

A paper in three parts in three successive numbers of the journal, providing a general introduction and the discussion of certain experiments on guinea pigs, rats, cats, apes, puppies, pigs and calves.

The conclusions drawn sometimes transcend the experimental evidence, but the main views of the author may be summarized as follows:—

(1) Since guinea pigs require relatively large quantities of vitamin C, their use as test animals to reflect this dietary deficiency is often of dubious value. Since the vitamin C requirements of the human infant are much lower, the guinea pig is not a suitable subject on which to test the deficiency of cows' milk for use in infant nutrition [obviously depends upon the technique adopted]. Experiments on milk from cows in summer (green food) and in winter (dry food) give conflicting results.

(2) Young rats and pigs as omnivores, and young dogs and cats as carnivores, are much less sensitive to deficiency of vitamin C than are guinea pigs. They readily develop rickets, however, in absence of vitamin D and on deficient diets in absence of sufficient light, air and exercise. The development of rickets is regarded as being hastened by various infections.

(3) Ultra-violet therapy is stated to have less efficacy with animals owing to the thick coat and the skin pigmentation. Irradiation of cows (including the udder) with the object of raising the vitamin content of the milk is useless, but direct irradiation of the milk itself, and of good milk powders, raises the vitamin D content.

Vigantol, an active antirachitic prophylactic and curative agent derived by irradiation of ergosterol, does not raise the milk yield or fat content when given in the rations of milk cows. For human use, irradiated milk is regarded as preferable to vigantol on the grounds that there is no fear of overdosage and that milk is rich in necessary minerals.

(4) Fresh green food rich in vitamins C and D, or good silage and sufficient exercise in the open, are regarded as essentials for the production of good milk.

(5) The feeding of boiled milk or milk heated to 85° C. for one minute may produce digestive disturbances, diarrhoea, pica and unthriftiness in young calves but such disturbances can be obviated by supplying various forms of fresh green stuff. The disturbances are regarded as due to destruction of vitamin C. By use of sterilized milk and green stuff calves can be reared free from tuberculosis.

[Data on the vitamin requirements of the young calf are scanty, but general bovine requirements of A, B and C, are known to be relatively very low—compare the older rice-feeding experiments on cattle, of THEILER, GREEN & DU TOIT (1915) "Contributions to the Study of Deficiency Diseases." *3rd & 4th Repts. Direct. Vet. Res., Union of S. Africa*. pp. 7-68 and the flaked maize experiments on growing heifers, THEILER, GREEN & DU TOIT (1927). "Minimum Mineral Requirements

of Cattle." *J. Agric. Sci.* **17**. 291-314. Compare also JONES, ECKLES & PALMER (1926). "The Rôle of Vitamin A in the Nutrition of Calves." *J. Dairy Sci.* **9**. 119.]

H. H. GREEN.

TECHNIQUE.

- I. CALMETTE, A. (1931). Procédé simple de préparation des sacs de collodion extra-minces pour les cultures *in vivo* ou *in vitro*. [**Preparation of very thin Collodion Sacs**].—*C. R. Soc. Biol. Paris.* **108**. 768-769.
- II. LE GUYON, R. (1931). Technique de choix pour la préparation des sacs de collodion employés en bacteriologie. [**Improved Method of Preparing Collodion Sacs**].—*Ibid.* 1222-1224. [7 refs.]

I. The following method is recommended for the preparation of very thin collodion sacs. A tube of suitable size, perforated at the rounded extremity with a minute hole, is plunged into molten gelatine (50 per cent.), withdrawn and inverted. As soon as the gelatine has set it is completely dehydrated in absolute alcohol. The tube is now lowered into the collodion solution (nitrocellulose 4 g., ether 30 c.c., alcohol 70 c.c. and glycerine 9 c.c.), carefully withdrawn, inverted and dried for one hour. Finally, the gelatine is removed by immersing the tube horizontally in water at 80° C.

II. Le Guyon prepares a collodion containing nitro-cellulose 40 g., 95 per cent. alcohol 460 c.c., and ether 500 c.c. The sacs are formed in tubes, the collodion being poured from one tube to another with constant rotation until the flow ceases. The tubes are allowed to dry in a reversed position for 15 minutes, rolled for two minutes and then placed upright for 30 minutes: finally they are plunged into water at 80° C. and the sacs withdrawn.

In order to obtain sacs of identical porosity with the same physico-chemical properties, the author stresses the importance of strictly adhering to a definite period of drying and also prefers sterilization in a special autoclave containing alcohol, according to the method of REPIN.

R. E. GLOVER.

RODENBECK. (1931). Ueber die Keimdichtigkeit papierner Verbandstoffhüllen und die zweckmässigste Gestaltung solcher Hüllen. [**On the Germ-proof Power of Paper Surgical Dressing Wrappers and the best Way of preparing them**].—*Zlb. Bakt. I. (Orig.)*. **123**. 241-250. 4 tables. [5 refs.]

The author tested several kinds of paper suitable for the wrapping up of surgical dressing materials for their power to keep out bacteria and found most of them efficient except when they had become wet. He recommends two layers of wrapping, the creases and gaps in each layer to occur at different positions on the packet. Zellophane was the best; other good papers were silk paper "pergamin," parchment substitute and hemp paper. Other papers tested were oilpaper, absorbent paper and cellulose paper.

J. E.